

# The Huxley family and the history of evolutionary theory

Frank Gaglioti  
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The publication of *An Intimate History of Evolution: The Story of the Huxley Family* by Alison Bashford in October 2022 highlights the history of two pivotal figures in the development of modern biological science, T. H. Huxley, the great popularizer and defender of Darwinian evolution, and his grandson Julian, an evolutionary scientist and pioneer in the use of film and television to make scientific concepts accessible to millions.

Both played important roles in the development of Darwinian evolution as the bedrock of modern biology, and its defence against religious dogma and other forms of backwardness and anti-science.

Bashford is Scientia Professor in History and Director of the Laureate Centre for History & Population at the University of New South Wales. Her previous works include *The New Worlds of Thomas Robert Malthus: Re-reading the Principle of Population* and *Global Population: History, Geopolitics, and Life on Earth*.

Although the book centres on Thomas Henry Huxley (1825-1895) and Julian Huxley (1887-1975), the family dynasty includes other notable figures: Aldous Huxley, author of the famous dystopian novel *Brave New World*, published in 1932, was Julian's younger brother; and the physiologist and biophysicist Andrew Huxley, Julian's half-brother, was awarded the Nobel Prize in 1963 for his work on nerve cell membranes.

Bashford's work is an important achievement as she relates the historical development of the theory of evolution through the work of T.H. Huxley and Julian Huxley. She shows how each man in each period produced extraordinary scientific work.

Importantly, she shows the historical antecedents for the development of evolution. She roots this in the Enlightenment that was a precursor for an explosion in science in the 19th and 20th centuries.

## Thomas Henry Huxley

"Charles Darwin's (1809-1882) and Thomas Henry Huxley's lives coincided with a great age of debate about origins and change," Bashford writes.

Huxley was born in 1825 in Ealing in west London. His family was lower middle-class and later moved to Coventry, in the Midlands, a centre of silk weaving and ribbon manufacture.

Bashford describes the political atmosphere that helped shape Huxley's views: "Coventry battled poverty and inequity, and it did so partly through a long tradition of dissenting politics." The city was a centre of the Chartist movement and followers of the utopian socialist Robert Owen.

"(For) Thomas Henry Huxley, this Coventry culture was a primer in the critique of orthodoxy. He set himself determined rituals of self-instruction, monumental by any measure, consuming a whole range of political philosophies that grounded his later actions, and indeed formed his very

self," Bashford states.

He originally trained as a doctor and was the assistant surgeon on the HMS Rattlesnake voyage to Cape York Peninsula in northern Australia and the Torres Strait, which separates Cape York from the island of New Guinea, from 1846 to 1850.

He began to consider the question of evolution in the 1850s after his voyage. This was a period of great scientific ferment. The work of the geologists such as Charles Lyell had greatly expanded estimates for the age of the earth and the discovery of fossils of strange extinct creatures contributed to the idea of evolution. Scientists participated in sea voyages allowing them to experience a much broader range of environments, the most famous being Darwin's voyage as the ship's naturalist on HMS Beagle from 1831 to 1836, where his evolutionary ideas started to crystallise.

In the 18th century, scientists had attempted to place the development of organisms within a materialist framework. Figures such as the French naturalist Étienne Geoffroy Saint-Hilaire, an early proponent of evolutionary ideas, and his colleague, comparative anatomist and zoologist Robert Edmond Grant, had an enormous impact on Darwin and his followers.

The burning question was to determine whether this distribution of organisms and species was the consequence of a natural law of evolution, and what that law might be.

Darwin conducted a campaign aimed at younger scientists such as Huxley in the period leading up to the publication in 1859 of his seminal work, *On the Origin of Species*.

Although Huxley was a convinced evolutionist, he didn't agree with Darwin's central mechanism—natural selection. Darwin discussed with scientists such as the botanist Joseph Dalton Hooker and Huxley in this period.

"In their many discussions, Darwin had to work hard to win Huxley over. Persuaded by evolution in general, Huxley was never disposed to natural selection," Bashford writes.

The publication of *On the Origin of Species* caused a great controversy, especially amongst religious layers. The most influential of the rebuttals of Darwin was the work of William Paley and his adherents of the religious concept of "natural theology."

Huxley was savagely opposed to any religious explanation of the origin of species. He became known as Darwin's bulldog for his indefatigable defence of evolutionary theory against religious obscurantism. "Huxley ... 'sharpened his beaks and claws' in readiness to defend *The Origin*," Bashford writes.

Famously, in 1860, Huxley successfully took part in a debate at the Oxford meeting of the British Association for the Advancement of Science against Bishop Wilberforce.

Bashford describes Huxley's stance as "most opposed to any kind of science that relied on a metaphysical causation. Darwin's theory categorically did not. As for politics, Huxley was deeply invested in

challenging a British scientific orthodoxy that was supported by the established Church and by elite class powers.”

The work of Darwin and his supporters in this period had a transformative impact on science, driving out any theory based on divine purpose from the biological sciences. Marx and Engels recognised the significance of Darwin’s work, that was parallel to Marx’s development in the same period of historical materialism demonstrating the materialist basis for human history.

One of Huxley’s most enduring aspects was his concern to make science accessible to the working class. He published *Lectures to Working Men* in 1865 and he conducted many such lectures. In 1880 he wrote “The Crayfish,” through which he introduced the principles of zoology to a general readership.

“It (“The Crayfish”) aimed to teach people to observe for themselves. Huxley imagined his reader with “The Crayfish” on one side of the table and the actual crustacean on the other, a step by step guide ... Finally he introduced evolution as the overarching pattern of explanation,” Bashford states.

## Darwinism in crisis and retreat

During the later part of Darwin’s life his theory went into decline and was to some extent discredited. This forced him to adopt aspects of Lamarckian evolution in later editions of *The Origin*.

The French naturalist Jean-Baptiste Lamarck was an earlier evolutionist who put forward the theory of acquired characteristics. This held that characteristics acquired during an organism’s life could be passed onto the next generation. This conception was contradicted by Darwin’s earlier work.

Darwin accepted the idea of blending inheritance widely supported at the time. This theory postulated that equal contributions were made through the female and male, resulting in characteristics in between the two.

He also put forward the theory of Pangenesis in his work *The Variation of Animals and Plants under Domestication* published in 1868.

Darwin proposed that each part of an organism emitted small particles which he called gemmules, that congregated in the gonads, providing the information for the reproduction of the organism in the gametes, this theory implied blending inheritance. Darwin was never satisfied with this notion and only ever claimed it as “hypothetical.”

The problem for Darwin was that any variation produced as part of the evolutionary process would be diluted after reproduction, thus wiping out any adaptive advantage.

Bashford explains Darwin’s dilemma: “If, over evolutionary time, blending inheritance eliminated variation, how then did natural selection—which absolutely required variation—operate?” She continues “the incapacity to address this question, and Darwin’s own insufficient answer, meant that scientifically speaking ‘Darwinism’ was in decline towards the end of the nineteenth century.”

Bashford writes that when Darwin died in 1882, “Huxley was out of date. In truth, soon after Darwin died aspects of ‘Darwinism’ looked moribund too.”

## Darwin, Mendel and the development of genetics

The main problem for Darwin and his supporters was that they didn’t

have a correct theory of inheritance. Although Gregor Mendel (1822-1884), the German-Czech scientist who discovered the laws of inheritance, was working at the same time as Darwin, his work remained unknown until its rediscovery at the turn of the century.

Mendel’s work was rediscovered independently in 1900 by Dutch botanist Hugo de Vries and German botanist Carl Correns.

It was left to the next generation of scientists, including T. H. Huxley’s grandson Julian, working in the first half of the 20th century, to resolve the crisis for Darwinian evolution. Until they did, it was still unclear how Mendelian genetics related to Darwinian evolution.

Julian Huxley’s early career was intimately involved with Mendelian genetics.

Bashford relates the significance of this work: “Julian was catapulted into exciting new Mendelian-inspired laboratory work, witnessing some of the early twentieth century’s key biological experiments that on the face of it were undoing natural selection as an idea, but in fact were slowly building it up again, now with new genetic knowledge on a surer footing.”

In 1912 he worked with William Bateson at his experimental breeding institution in Britain. Bateson replicated Mendel’s crosses with peas and carried out experimental work with various animal and plant species, even before Mendel’s work was recognised.

Later on, in 1912 Huxley spent time at Thomas Hunt Morgan’s Fly Room at Columbia University. Morgan, an avid supporter of neo-Lamarckism opposing Darwin’s conception of natural selection, wrote the ‘foundational text’ of Mendelian genetics, *The Mechanism of Mendelian Heredity*, in 1915.

Slowly the groundwork was being created to establish the link between genetics and Darwinian evolution. Scientists such as J.B.S. Haldane, Sewall Wright and Ronald Fisher established the principles of population genetics.

Fisher wrote the seminal text showing the unity of Darwinian evolution and Mendelian genetics, *The Genetical Theory of Natural Selection* in 1930, dedicated to Julian’s father Leonard.

Bashford quotes Julian Huxley on the significance of Fisher’s work: “the particulate theory of modern genetics provides firm support for Darwin; only on a particulate basis will Natural Selection be effective.”

The “particulate theory” is an early term referring to what would come to be called genes, the basic unit of genetic information that was shown to be the basis for Natural Selection.

Bashford continues that “Not blending inheritance, not old ‘atavistic’ genes recurring, but mutations, new combinations—recombinations—passed on over generations, and this was now proven to be the case, experimentally and statistically.”

Although Julian Huxley didn’t make any scientific breakthroughs in this revolution, he brought together all the strands in an accessible form.

He wrote *Evolution: The Modern Synthesis*, published in 1942, which completed the restoration of Darwinian evolution but with a more secure foundation with Mendelian genetics at its core. This new synthesis was a critical part of an explosion of the biological sciences.

“The whole added up to a re-animation of Darwinism in the light of new knowledge of mutation on the one hand and recombination on the other. Darwinism was born again,” Bashford states.

Like his grandfather T. H. Huxley, Julian was a great populariser of science in order to bring it to the masses.

He was one of the first to make nature documentaries. In 1934 he produced the short film “The Private Life of Gannets” that was awarded an Academy Award in 1938. He produced a series on natural history films including “Animals of the Rocky Shore” in 1937.

In 1951 he launched the career of the nature television presenter David Attenborough. Julian Huxley narrated Attenborough’s first television documentary, “Coelacanth,” about a group of primitive fish that were known in the fossil record and whose living specimens had recently been

discovered. Attenborough became famous for the important natural history documentaries made for the BBC.

### Julian Huxley, Stalinism and Lysenko

Julian Huxley was very much a man of the 20th century and embodied all its contradictions. Central to this was his relationship to the Soviet Union and Stalinism.

This is the weakest aspect of Bashford's work as she equates Stalinism with "Marxist-Leninist doctrine." She shows no understanding of the history of the Russian Revolution.

Julian Huxley visited the Soviet Union on two occasions in 1931 and towards the end of World War II in 1945. In his first visit Huxley demonstrated a very sympathetic attitude to the USSR and the strides it was making and its supportive attitude towards the sciences.

Bashford doesn't examine Julian Huxley's first visit to the Soviet Union, which he describes in his book published in 1932, *A Scientist Among the Soviets*. In this period the Stalinist regime still allowed scientists a relatively free hand, even though the bureaucracy had usurped political power from the working class.

The principal leaders of the Russian Revolution, Lenin and Trotsky, had recognised the importance of science in the development of a socialist society and encouraged scientific work.

Even in the depths of the Civil War, in the midst of great social privation, science was encouraged, and the USSR produced some of the most outstanding figures in world science. Scientists were sent all over the world to collaborate with their peers internationally.

In the biological sciences, the Nobel Prize-winning physiologist, Ivan Pavlov, was given financial support and the facilities needed to continue his research.

In 1931, Julian Huxley visited N.I. Vavilov, an agricultural scientist and plant breeder at the Institute of Plant Industry in Leningrad. He describes the Institute as a "vast affair" and Vavilov as a botanist of "international reputation."

Vavilov was using the latest scientific developments in genetics to produce new varieties of crops such as cereals, flax, and sunflowers. Julian Huxley noted that the Institute had a collection of 28,000 wheat varieties, many of which were collected by Vavilov in his expeditions around the world. Vavilov's aim was to obtain samples of the world's cultivated plants. Vavilov and his fellow scientists accumulated 350,000 cultivated plants—the largest collection in the world.

Julian Huxley recommended, "Anyone wanting to make a special study of cereals must come to Leningrad, for the Institute's collection is by far the largest in existence."

Vavilov's plant-collecting expeditions were guided by a profound theoretical understanding of the development of cultivated plants.

Yet the period when Julian Huxley was visiting the Soviet Union was one of a growing crisis in Soviet agriculture.

Trotsky and the Left Opposition had warned that the Stalinist orientation to the rich peasants at the expense of agriculture as a whole and industry would result in disaster.

In 1928 there was a massive grain crisis, to which the Stalinists responded by ruthless grain requisitions, resulting in mass starvation. In 1929 another shift was made with the imposition of the brutal policy of forced collectivisation. Peasants responded by burning their crops and killing their animals rather than allowing them to be seized on the orders of the Stalinist regime. As a result, agricultural output plummeted.

One of the consequences of this disastrous program and the resulting famines was that the Stalinist regime began to demand that the scientists

quickly develop new crop plants. This went against the meticulous and painstaking work needed for them to develop improved plant and animal varieties, which often took over a decade.

The Stalinists moved against the scientists who based their work on the new science of genetics, promoting anyone who promised rapid results. This program was most graphically represented in the elevation of the agronomist Trofim Lysenko, who advocated pseudo-scientific methods for breeding.

The Stalinists and Lysenko launched vicious attacks on the Mendelian geneticists as being anti-Marxist. One of the most tragic expressions of this was Vavilov's arrest in 1941. He was sentenced to death, commuted to 20 years imprisonment. Vavilov died in 1943 due to the privations of prison life.

In Julian Huxley's second visit to the Soviet Union in 1945 he attended a lecture given by Lysenko at the Academy of Agricultural Science. He described Lysenko as "scientifically illiterate."

Bashford cites Huxley remarking that "Lysenko and his followers are not scientific in any proper sense of the word. They do not adhere to recognized scientific method, or employ normal scientific precautions, or publish their results in a way that renders their scientific evaluation possible."

While Huxley understood that Lysenko was a scientific charlatan, he had no understanding of the political shift that had taken place within the Soviet Union. Politically he was a left liberal who along with many intellectuals of the time operated within the orbit of Stalinist politics.

Foremost in this uncritical approach to Stalinism was his relationship with the evolutionary biologist J.B.S. Haldane (1892-1964), who was a member of the British Communist Party. Haldane played a pernicious role as he covered for the Stalinist suppression of the Mendelian geneticists within the Soviet Union, even as he made critical contributions to the development of the Darwinian synthesis in the West.

In 1948 Haldane gave a notorious address for the BBC where he defended Lysenko's pseudoscience, knowing full well that Vavilov had been removed from his post and disappeared.

### Eugenics and Malthusianism

Bashford spends considerable time describing Julian Huxley's support for eugenics, along with several other liberal intellectuals of the period. He was also an avid Malthusian. Even with the exposure of the horrific consequences of the eugenics program adopted by the Nazis, Huxley remained a firm advocate of eugenics after the Second World War.

"Julian thought and wrote often about 'quality'—of people, of societies—but this was preceded by a quantitative breeding problem—overpopulation—and its solution, birth control. Like most Malthusians and eugenicists of his generation, Julian thought that the 'quantity' needed to be addressed before, or at least alongside, the eugenic 'quality' problem," Bashford states.

"Both would help deliver a better human future, and he was entirely sure of this before, after and in the light of Nazi eugenics. For him, the German program was a dire abuse of eugenics, which itself should—Julian would say 'must'—be reclaimed for the best human future."

Bashford quotes Leonard Huxley, Julian's father, voicing an explicitly reactionary version of eugenics: "we look on complacently while the feeble-minded multiply ... free to breed superabundantly, to bring down the general level of intelligence and character, and to be a life-long and growing burden on the rest of society."

Julian Huxley did not share this view, by all accounts. But even into the 1960s Julian Huxley saw sterilisation as the favoured method for

improving humanity. He was the president of the Eugenics Society until 1962.

These issues affected his brother's outlook as well. Aldous Huxley's *Brave New World* (1932) depicts a future world inhabited by an "improved" human race.

"In Aldous Huxley's famous futurist dystopia, his brave new world, 'World State' humans are made in artificial wombs, managed by foetus technicians who work in the 'Central London Hatchery'. Once 'born', citizens of the World State are 'sleep conditioned' into a peaceful compliance and retained thus partly by the drug Soma," Bashford comments.

Despite some weaknesses, Bashford's work is an important contribution to the history of the scientific theory of evolution as it was embodied in the lives of the Huxley dynasty and deserves to be read.



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