Introduction: "The Darwinian Theory of Evolution"

Michael Ruse[†]

Introduction[1]

"Is the Professor descended from monkeys on his grandfather's side or his grandmother's side?"
"I would rather be descended from a monkey than from a bishop of the Church of England."

The English naturalist, Charles Darwin, published his great evolutionary work *On the Origin of Species by Means of Natural Selection,* towards the end of 1859. The next summer, in Oxford at the annual meeting of the British Association for the Advancement of Science, the Bishop of Oxford, Samuel Wilberforce, debated Thomas Henry Huxley, Professor at the Royal School of Mines, on the topic of Darwin's book. Hence, the exchange quoted just above. Almost certainly an exaggeration of what was actually said, but one of those cases where fiction tells more than fact (Lucas 1979). Evolution through natural selection was a controversial topic. Although in the *Origin* Darwin said little about our species – see below for details – the worry in people's minds was that we are no more than hairless apes. And if this be so, there are a horrendous number of questions to be answered and an equally large number of beliefs to be revised or cast away (Ruse 2024). For a start, what of Adam and Eve? If they did not exist and if that wretched apple had never been eaten, why on earth are we so sinful? Did God make it an inherent part of our nature? If this be so, why on earth blame us?

Controversy haunts Darwin's theory to this day. In the one corner, there are the beyond-the-pale Biblical Literalists – "Scientific Creationists" – who still insist on a six-day miraculous creation, done directly by God. An impetuous deity who, shortly later, dissatisfied with the way things are going, flooded the world and started again (Ruse 1982, Pennock & Ruse 2008). In the other corner, there are ardent evolutionists who think, nevertheless, that Darwin got the causes all wrong and that truly it was self-directing forces, akin to those that lead an acorn to develop into an oak, that lead the progress up from single-celled organisms, prokaryotes, to the apotheosis of the evolutionary process, humankind (Reiss & Ruse 2023).

"Begin at the beginning," to quote the useful advice of Dylan Thomas's radio play *Under Milk Wood.* Useful advice that will guide this essay. There is a huge amount about Darwin's theory to which – in a career of scholarship that has lasted over fifty years – I have made my contribution (notably Ruse 1979, 2013, 2024, Richards & Ruse 2016, Ruse & Richards 2008). I shall not try for an overall synthesis, but more modestly introduce Darwin's theory and speak to one or two of its more salient features. Above all, I will try to be value-free, neither defending Darwin's thinking nor criticizing it. Before we get to the controversies, let us look at the theory.

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[1] My two contributions to this publication are obviously tackling a shared theme – the relevance of Charles Darwin's theory of evolution to social issues today – and as obviously should be read in order, with this being the first. Knowing, however, that not everyone will have time or inclination to read both, I have fashioned them as stand-alone essays.

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Charles Darwin

Charles Darwin (1809-1882) was born into the English upper-middle-classes (Browne 1995, 2002). His paternal grandfather was Erasmus Darwin, a physician and early evolutionist. His son, Robert, the father of Charles, was also a physician, and wealthy, both from his practice and from acting as a middleman, arranging loans to impecunious landowners from businessmen with capital to loan. The family riches were much augmented through Charles Darwin's mother, the daughter of one of the most successful industrialists of the day, Josiah Wedgwood, owner of the great pottery works. Charles, who spent three years as an undergraduate at Cambridge, never in his life had to work for a living, especially after he married his first cousin Emma Wedgwood, another grandchild of Josiah Wedgwood. Darwin devoted himself first to geology, spending five years circumnavigating the world aboard HMS *Beagle*, and then, on his return becoming an evolutionist (early in 1837), increasingly to natural history (Sulloway 1982). He found the cause of evolution late in 1838. As gravity explained the Copernican heliocentric view of the universe, so Darwin's "natural selection" explained the tree of life. For twenty years, Darwin did not announce his commitment to evolution to the world, until finally – spurred by the arrival of an essay with similar ideas penned by the naturalist Alfred Russel Wallace (1858) – in 1859 Darwin published *On the Origin of Species by means of Natural Selection*. Twelve years later, in 1871, he followed up with *The Descent of Man and Selection in Relation to Sex*. The English dislike intensely anyone who publicly parades their abilities and accomplishments in public. But they know and celebrate a hero when they see one. Darwin may have been controversial. He was certainly important. On his death he was buried in England's Valhalla, Westminster Abbey. There he lies, through eternity, together with that other great English scientist, Isaac Newton.

Natural selection

The *Origin* is divided into three parts. The first part – "Chapter I: Variation under Domestication" – deals with artificial selection, setting it up as a perceived analogy to the inferred natural selection. To this end, Darwin discussed in some detail the successes of breeders, both in the farmyard – cows, pigs, and the like – and in the world of fanciers, pigeon breeders particularly. "Altogether at least a score of pigeons might be chosen, which if shown to an ornithologist, and he were told that they were wild birds, would certainly, I think, be ranked by him as well-defined species" (Darwin 1859, p. 22). How does this come about? "The key is man's power of accumulative selection: nature gives successive variations; man adds them up in certain directions useful to him. In this sense he may be said to make for himself useful breeds" (p. 30).

Then, second (II, III, IV), having noted the variation that appears naturally in every population, Darwin introduced natural selection. This is a two-part argument. First, there is the "struggle for existence."

> A struggle for existence inevitably follows from the high rate at which all organic beings tend to increase. Every being, which during its natural lifetime produces several eggs or seeds, must suffer destruction during some period of its life, and during some season or occasional year, otherwise, on the principle of geometrical increase, its numbers would quickly become so inordinately great that no country could support the product. Hence, as more individuals are produced than can possibly survive, there must in every case be a struggle for existence, either one individual with another of the same species, or with the individuals of distinct species, or with the physical conditions of life. (pp. 63-64)

Then, combining the struggle with the variation in populations, we move on to "natural selection."

> Let it be borne in mind in what an endless number of strange peculiarities our domestic productions, and, in a lesser degree, those under nature, vary; and how strong the hereditary tendency is. Under domestication, it may be truly said that the whole organisation becomes in some degree plastic. Let it be borne in mind how infinitely complex and close-fitting are the mutual relations of all organic beings to each other and to their physical conditions of life. Can it, then, be thought improbable, seeing that variations useful to man have undoubtedly occurred, that other variations useful in some way to each being in the great and complex battle of life, should sometimes occur in the course of thousands of generations? If such do occur, can we doubt (remembering that many more individuals are born than can possibly survive) that individuals having any advantage, however slight, over others, would have the best chance of surviving and of procreating their kind? On the other hand, we may feel sure that any variation in the least degree injurious would be rigidly destroyed. This preservation of favourable variations and the rejection of injurious variations, I call Natural Selection. (pp. 80-81)

Final causes

A number of points before we move on. First, and most importantly, Darwin thought he had solved the problem of final cause (Ruse 2017). "Final cause"? The great Greek philosophers, Plato (428-348 BCE) and Aristotle (384-322 BCE), were both committed to the vision of the world – what linguists call a "group metaphor" and what many, influenced by Thomas Kuhn, call a "paradigm" – as organic. Organicism! Famously, working within the organic root metaphor, the great Greek philosopher Aristotle divided causes into four categories (*Physics,* 194b16–195a3). Suppose we want to make a statue, for example a British private – a "Tommy" – from the First World War (Riess & Ruse 2023, p. 17). You start with the *efficient* cause, the modeler or sculptor who actually made the statue. Then next you have the *material* cause, the substance from which it is made. Metal (bronze) or stone (marble) or what? Then you have the *formal* cause, the pattern. The model must look like a real British soldier. It would not be wearing a hat with a Pickelhaube for instance. And then, fourth, in a way the most important of all, you have the *final* cause. The teleological element behind your commissioning the statue. Why is it being made? The answer is simple. Future generations will be alerted to, give thanks for, the sacrifices of such simple men and his comrades.

Now, note although human-made objects have final causes, generally we would not say that random pieces of nonorganic material have final causes. A pebble on the beach is just a pebble on the beach. No less, but importantly no more. However, when we come to organisms, we do want to talk in terms of final cause. Birds have wings in order to fly. Flowers have pretty colors in order to attract insects, who in order to get nectar end by carrying fertilizing pollen from one plant to another. How do we explain organic final cause? Plato thought it was the result of God, which he identified as the Form of the Good, making the conscious decision to give organisms functioning parts, ends. Aristotle thought that there are special forces that direct things to their ends, forces that two and a half millennia later, the French philosopher Henri Bergson (1907) called é*lans vitaux* (singular *élan vital*).

The Scientific Revolution – Copernicus to Newton – brought in a rival root metaphor. The machine.

> At all times there used to be a strong tendency among physicists, particularly in England, to form as concrete a picture as possible of the physical reality behind the phenomena, the not directly perceptible cause of that which can be perceived by the senses; they were always looking for hidden mechanisms, and in so doing supposed, without being concerned about this assumption, that these would be essentially the same kind as the simple instruments which men had used from time immemorial to relieve their work, so that a skillful mechanical engineer would be able to imitate the real course of the events taking place in the microcosm in a mechanical model on a larger scale. (Dijksterhuis 1961, p. 497)

This all made the problem of final cause really pressing. Although machines might have overall ends – the lawnmower is for cutting grass – considered as objects in themselves they have no ends – the blades are just going round and round. The solution of the chemist/philosopher Robert Boyle was to kick the whole problem across to religion. In his *Disquisition about the Final Causes of Natural Things*, Boyle wrote:

> For there are some things in nature so curiously contrived, and so exquisitely fitted for certain operations and uses, that it seems little less than blindness in him, that acknowledges, with the Cartesians [followers of the French philosopher Descartes], a most wise Author of things, not to conclude, that, though they may have been designed for other (and perhaps higher) uses, yet they were designed for this use (Boyle 1688, 5: 397-398).

Continuing, that supposing that "a man's eyes were made by chance, argues, that they need have no relation to a designing agent; and the use, that a man makes of them, may be either casual too, or at least may be an effect of his knowledge, not of nature's." However, intermingling science and religion, the penalty from taking us away from a designing intelligence is taking us from the chance to do science—the urge to dissect and to understand how the eye "is as exquisitely fitted to be an organ of sight, as the best artificer in the world could have framed a little engine, purposely and mainly designed for the use of seeing" (5: 398).

So, Boyle tells us, we go from science to theology and onto God. Expectedly, we find continental philosophers worrying about this. The greatest of them all, Immanuel Kant, devoted a considerable section of his *Third Critique, The Critique of Teleological Judgement* (1790), to this very problem. As an avowed Newtonian, Kant started with the premise that organisms are just machines. As one raised a Pietist (a kind of ultra-Lutheran), Kant wanted no truck with natural theology and the like. Given that science is the domain of reason and evidence, we cannot therefore put final cause down to God (even if, on faith, we may believe this). Kant's trick – "evasive strategy," if you like – was to regard final-cause thinking as a *heuristic* guide. Final causes help us think about organisms. They are "regulative." They are not part of reality.

> It is indeed quite certain that we cannot adequately cognise, much less explain, organised beings and their internal possibility, according to mere mechanical principles of nature; and we can say boldly it is alike certain that it is absurd for men to make any such attempt or to hope that another Newton will arise in the future, who shall make comprehensible by us the production of a blade of grass according to natural laws which no design has ordered. We must absolutely deny this insight to men. (Kant [1790] 2000, pp. 312-313)

Charles Darwin was always a teleologist and through the *Origin* quite unselfconsciously referred to final causes.

> It is now commonly admitted that the more immediate and final cause of the cuckoo's instinct is, that she lays her eggs, not daily, but at intervals of two or three days; so that, if she were to make her own nest and sit on her own eggs, those first laid would have to be left for some time unincubated, or there would be eggs and young birds of different ages in the same nest (Darwin 1859, pp. 216-217, my italics).

Adding that: "If this were the case, the process of laying and hatching might be inconveniently long, more especially as she has to migrate at a very early period; and the first hatched young would probably have to be fed by the male alone."

"Taking randomness [of variations] as its starting point, the *Origin*'s tour-de-force is in managing to recoup all results of classical teleology" (Hoquet 2018, p. 113). The key to such thinking, why Darwin has claim to be the Newton of biology, lies in the fact that selection leads to *adaptations*, the features organisms have to survive and reproduce. "How have all those exquisite adaptations of one part of the organisation to another part, and to the conditions of life, and of one distinct organic being to another

being, been perfected?" (Darwin 1859, p. 60). Because features have in the past enabled organisms to survive and reproduce, we project to the future assuming that they will continue to enable. We could be wrong. Climatic change or a new predator might mean that features formerly helpful but are now not helpful. But that is always the risk with final-cause explanation. The missing goal object. What happens when the object of the final cause vanishes? There is an accident, the statue of the Tommy is destroyed and there is no money for a duplicate. It is not a new problem with Darwin. For Plato, final causes escape from the missing goal problem because we have the idea of the desired end. For Aristotle, final causes escape the problem because the vital force is directed towards the desired end. For Darwin, final causes escape the problem because that is what happened in the past. If things change so the intended final cause never materializes, it is still the case that the final causes occurred in the past, and it is an inductively reasonable supposition that they will go on occurring in the future. Final causes without tears, but still very much final causes. Darwin is a mechanist. Darwin is also a full-blooded teleologist. Kant has been answered.

Note however, agreeing with Plato and Aristotle about the teleological nature of individual organisms did not imply that Darwin agreed with any philosophers (including Plato and Aristotle) about the teleological nature of the history of life, with humans at the top (Ruse 1996). There is little doubt that Darwin thought humans are the top and that certain islanders living off the coast of Europe – "This precious stone set in the silver sea" – are the top of the top, but that was not an implication of his theory. From the first, Darwin saw that the natural selection of random variations rules out teleological direction to the top. What works is what works. However, what Darwin himself thought and what Darwin thought his theory implied were two different things, even though there were times when he had trouble keeping the two apart, as in the closing words of the *Origin*.

> There is grandeur in this view of life, with its several powers, having been originally breathed 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. (p. 490)

Individual versus group selection

Second, Darwin introduced a secondary mechanism, sexual selection (Richards 2013, 2017). A struggle for mates, not a struggle against the elements. "This depends, not on a struggle for existence, but on a struggle between the males for possession of the females; the result is not death to the unsuccessful competitor, but few or no offspring" (p. 88). Darwin distinguished male combat – stags fighting for the harem – and female choice – peahens choosing the peacock with the most magnificent tail feathers. The idea of sexual selection is not an afterthought. Right back in the fall of 1838, as soon as he discovered natural selection, Darwin was floating ideas that crystalize into sexual selection. "Is it Male that assumes change, & is the offspring brought back to earlier type by Mother? — do these differences indicate, species changing forms, & loosing do if so domestic animals ought to show them. — Anyhow not connected with habits" (Darwin 1987, D 147e). Darwin makes little use of this form of selection in the *Origin*. Later, it will be different.

Note that sexual selection points to an important aspect of Darwin's thinking about selection. It is always for the benefit of the individual (including one's relatives) and not the group (Ruse 2022a, b). From the first, Wallace had thought of selection as something operating at the group level. The title of his discovery paper flags this: "On the tendency of *varieties* to depart indefinitely from the original type" (my italics). One can infer, therefore, that he supposed that the sterility of hybrids, like the mule, was a function of selection working in favor of the parental groups – horses and donkeys don't want offspring, literally neither fish nor fowl. Revealingly, Darwin responded:

> Let me first say that no man could have more earnestly wished for the success of N. selection in regard to sterility, than I did; & when I considered a general statement, (as in your last note) I always felt sure it could be worked out, but always failed in detail. The cause being as I believe, that natural selection cannot effect what is not good for the individual, including in this term a social community. (Letter to Wallace, April 6, 1868)

The tree of life

One more move to arrive at a third point. Darwin introduced Adam Smith's notion of the "division of labor." We work for our own ends and, thanks to the Divine Scotsman Up Above, everything meshes and is for the good of all. "It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own self-interest. We address ourselves not to their humanity but to their self-love, and never talk to them of our own necessities, but of their advantages" (Smith 1776, p. 18). Picking up on this, Darwin wrote: "No naturalist doubts the advantage of what has been called the 'physiological division of labour;' hence we may believe that it would be advantageous to a plant to produce stamens alone in one flower or on one whole plant, and pistils alone in another flower or on another plant" (pp. 93-94).

This is true at the group level also. "The advantage of diversification in the inhabitants of the same region is, in fact, the same as that of the physiological division of labour in the organs of the same individual body." Hence: "in the general economy of any land, the more widely and perfectly the animals and plants are diversified for different habits of life, so will a greater number of individuals be capable of their supporting themselves." Although we are dealing with things at the group level, understand that it is selection working at the individual level that is the causal factor – individuals capable of self-support (pp. 115-116).

And now, the climax. As Newton's cause explains the overall picture of the heliocentric universe, Darwin's cause explains the overall picture of the history of life.

> The affinities of all the beings of the same class have sometimes been represented by a great tree. I believe this simile largely speaks the truth. The green and budding twigs may represent existing species; and those produced during each former year may represent the long succession of extinct species. At each period of growth all the growing twigs have tried to branch out on all sides, and to overtop and kill the surrounding twigs and branches, in the same manner as species and groups of species have tried to overmaster other species in the great battle for life. The limbs divided into great branches, and these into lesser and lesser branches, were themselves once, when the tree was small, budding twigs; and this connexion of the former and present buds by ramifying branches may well represent the classification of all extinct and living species in groups subordinate to groups. Of the many twigs which flourished when the tree was a mere bush, only two or three, now grown into great branches, yet survive and bear all the other branches; so with the species which lived during long-past geological periods, very few now have living and modified descendants. From the first growth of the tree, many a limb and branch has decayed and dropped off; and these lost branches of various sizes may represent those whole orders, families, and genera which have now no living representatives, and which are known to us only from having been found in a fossil state. As we here and there see a thin straggling branch springing from a fork low down in a tree, and which by some chance has been favoured and is still alive on its summit, so we occasionally see an animal like the Ornithorhynchus or Lepidosiren, which in some small degree connects by its affinities two large branches of life, and which has apparently been saved from fatal competition by having inhabited a protected station. As buds give rise by growth to fresh buds, and these, if vigorous, branch out and overtop on all sides many a feebler branch, so by generation I believe it has been with the great Tree of Life, which fills with its dead and broken branches the crust of the earth, and covers the surface with its ever branching and beautiful ramifications. (pp. 129-130)

The consilience

Moving quickly to the third part of the *Origin* (V—XIV), Darwin gave a classic example of what the philosopher of science William Whewell (1840) called a "consilience of inductions," when many disparate parts of science are integrated under one hypothesis. We start with instinct, where Darwin explained the sterility of worker insects like ants in terms of the benefits in being part of an integrated team, a "social community." Moving on briskly through the other areas, next comes "paleontology" – the fossil record. The gaps in the record are apparently a function of non-deposition rather than non-existence. More positively, the overall record is explained in terms of descent with modification. How else is one going to explain that fossil forms are not randomly distributed but that new forms are frequently – usually – similar to forms little further down the record, and thus little more recent than the older forms? Darwin also takes up the common finding that the fossils of long-extinct organisms often seem to link organisms very different today. Ancient forms show the archetype that today is put to very different uses – wings, fins, legs, arms – by today's organisms. "It is a common belief that the more ancient a form is, by so much the more it tends to connect by some of its characters groups now widely separated from each other" (p. 330). Hard to prove generally: "Yet if we compare the older Reptiles and Batrachians, the older Fish, the older Cephalopods, and the eocene Mammals, with the more recent members of the same classes, we must admit that there is some truth in the remark" (pp. 330-331). Evolution offers the explanation.

Many think that the truth of evolution lies with the fossil record. Not for nothing did the American Creationist Duane T. Gish (1973) call his anti-evolution tract, *Evolution: The Fossils Say No!* To the contrary, Darwin, and professional evolutionists following in his path, regard "Geographical distribution" (Chapters XI and XII) as a very strong point, if not the strongest. If there is no evolution, then why did God so love the Galapagos as to furnish the islands with their own species of bird and tortoise? And why are the birds of the Galapagos like the birds of S. America rather than the birds of Africa? And why does the converse also hold true of the birds of the Cape Verde islands of the Atlantic with respect to Africa and S. America?

> There is nothing in the conditions of life, in the geological nature of the islands, in their height or climate, or in the proportions in which the several classes are associated together, which resembles closely the conditions of the South American coast: in fact there is a considerable dissimilarity in all these respects (p. 398).

And so, we move on towards the end of the consilience, covering "Classification," "Morphology," "Embryology," and "Rudimentary Organs" (XIII). Classification or Systematics reflects the history of life: "the natural system is founded on descent with modification" (p. 420). Morphology, the Unity of Type.

> The explanation is manifest on the theory of the natural selection of successive slight modifications,—each modification being profitable in some way to the modified form, but often affecting by correlation of growth other parts of the organisation. In changes of this nature, there will be little or no tendency to modify the original pattern, or to transpose parts (p. 435).

Going out of order, Rudimentary Organs are easily explained as features that were of little value and so evolution often left them behind, not bothering to eliminate them. Far more interesting is Embryology, a particular favorite of Darwin. He saw the nature and development of embryos to be a function of the ages at which natural selection becomes active. If the embryos and adults of two different species are different all the way, then one presumes that the forces of selection are active all through the organisms' development. But if, as frequently happens, there is much similarity between the embryos of organisms very different as adults, then one suspects that selection only came into play

when the organisms were born. Up to then, there is no reason to think that selection is tearing them apart. That only happens when they have left the security of the womb or its equivalent.

Humankind

The *Origin* says little about our species. Just a brief comment so he couldn't be charged with avoiding the topic. "In the distant future I see open fields for far more important researches. Psychology will be based on a new foundation, that of the necessary acquirement of each power and capacity by gradation. Light will be thrown on the origin of man and his history" (p. 488). One senses that, having finished the *Origin*, Darwin had little interest in following up his brief comment. His next major project was orchids, a topic he explored vigorously for a couple of years (Darwin 1862). Not exactly what one might have expected from the author of the most important book in the history of the life sciences. Darwin's non-involvement in the evolution of our species ended with the apostasy of Wallace. By the mid-1860s, the co-discoverer of natural selection was showing troubling signs of entanglement with pseudo-science. He was increasingly vocally vehement that the only plausible explanation for the evolution of humankind was the action of spirit forces. Appalled, Darwin set about giving a naturalistic explanation involving selection. *The Descent of Man and Selection in Relation to Sex* appeared in 1871.

In respects the book is unremarkable and much what one might have expected from the Englishman who had authored the *Origin.* We start with some general reflections on the plausibility of our evolutionary origins, followed by discussion of our differences from the apes. We must "admit that there is a much wider interval in mental power between one of the lowest fishes, as a lamprey or lancelet, and one of the higher apes, than between an ape and man" (1, 35). Expectedly, natural selection has a major role to play here and, whenever convenient, Wallace's thinking was compared unfavorably. As is flagged by the full title of the work, the nature and effects of Darwin's secondary mechanism, sexual selection, got a detailed and comprehensive treatment. This was spurred by Wallace's claim that such things as human hairlessness can hardly be the consequence of natural selection. Darwin agreed with the point Wallace was making; but, rather than turning to spirit forces for help, he argued that sexual selection rather than natural selection was the cause! "The absence of hair on the body is to a certain extent a secondary sexual character; for in all parts of the world women are less hairy than men. Therefore we may reasonably suspect that this is a character which has been gained through sexual selection" (2, 376). Humans are animals and as such subject to the same laws as other animals. Light is indeed thrown on man and his history.

Is this claim born out? Let me give one example to show how Darwin proceeds. Take morality and let us focus on what philosophers call "substantive ethics." What should I do? For Christians: love my neighbor as myself. A very traditional approach is taken by Huxley, one which I suspect that paradoxically (given that he is the chap who invented and adopted the term "agnostic") a good many Believers would find highly congenial. He tells us, in *Evolution and Ethics,* a late, oft-quoted essay: "Man, the animal, in fact, has worked his way to the headship of the sentient world, and has become the superb animal which he is, in virtue of his success in the struggle for existence" (Huxley 1891). He "has been largely indebted to those qualities which he shares with the ape and the tiger; his exceptional physical organization; his cunning, his sociability, his curiosity, and his imitativeness; his ruthless and ferocious destructiveness when his anger is roused by opposition." However, this is tempered and controlled by our moral sense. Here Huxley relied on the analogy between cultural evolution and biological evolution. Morality is entirely a cultural phenomenon: "Of moral purpose I see not a trace in nature. That is an article of exclusively human manufacture" (Huxley 1900, 2, 285). Our biological self is curbed by our cultural self: "Ethical nature may count upon having to reckon with a tenacious and powerful enemy as long as the world lasts. But, on the other hand, I see no limit to the extent to which intelligence and will, guided by sound principles of investigation, and organized in common effort,

may modify the conditions of existence, for a period longer than that now covered by history." There speaks a good Christian Agnostic.

The contrast with Darwin, who really believed in his theory, is striking. Unlike Huxley, Darwin thought that more conventional morality – love your neighbor as yourself, sort of thing – came because of, rather than despite, (biological) natural selection (Ruse 2022a, b). Tribes of people who get along and help each other do better than tribes who don't.

> It must not be forgotten that although a high standard of morality gives but a slight or no advantage to each individual man and his children over the other men of the same tribe, yet that an advancement in the standard of morality and an increase in the number of well-endowed men will certainly give an immense advantage to one tribe over another. There can be no doubt that a tribe including many members who, from possessing in a high degree the spirit of patriotism, fidelity, obedience, courage, and sympathy, were always ready to give aid to each other and to sacrifice themselves for the common good, would be victorious over most other tribes; and this would be natural selection. (Darwin 1871, 1, 166)

"Victorious over most other tribes"? Is this not an appeal to group selection? Not at all! Shortly before this passage, Darwin implies that (what today is known as) "reciprocal altruism" is a major causal factor. You scratch my back and I will scratch yours: "as the reasoning powers and foresight of the members [of a tribe] became improved, each man would soon learn from experience that if he aided his fellow-men, he would commonly receive aid in return" (1, 163). Also, Darwin thought that what we now call "kin selection" was at work. As with the sterile Hymenoptera, members of tribes are interrelated or think they are – the founding ancestor being the Wolf or some such body.

That we have this moral sense explains some of the more convoluted arguments in the *Descent*. The steelworks owner Andrew Carnegie is, with reason, known as a traditional "Social Darwinian." "The price which society pays for the law of competition, like the price it pays for cheap comforts and luxuries, is also great; but the advantages of this law are also greater still, for it is to this law that we owe our wonderful material development, which brings improved conditions in its train." Adding that "while the law may be sometimes hard for the individual, it is best for the race, because it insures the survival of the fittest in every department" (Carnegie 1889, p. 655).

Darwin makes Carnegie look like a wimp.

> With savages, the weak in body or mind are soon eliminated; and those that survive commonly exhibit a vigorous state of health. We civilised men, on the other hand, do our utmost to check the process of elimination; we build asylums for the imbecile, the maimed, and the sick; we institute poor-laws; and our medical men exert their utmost skill to save the life of every one to the last moment. There is reason to believe that vaccination has preserved thousands, who from a weak constitution would formerly have succumbed to small-pox.

With obvious bad consequences.

> Thus the weak members of civilised societies propagate their kind. No one who has attended to the breeding of domestic animals will doubt that this must be highly injurious to the race of man. It is surprising how soon a want of care, or care wrongly directed, leads to the degeneration of a domestic race; but excepting in the case of man himself, hardly any one is so ignorant as to allow his worst animals to breed. (1, 168)

But things are not quite this simple.

> The aid which we feel impelled to give to the helpless is mainly an incidental result of the instinct of sympathy, which was originally acquired as part of the social instincts, but subsequently rendered, in the manner previously indicated, more tender and more widely diffused. Nor could we check our sympathy, if so urged by hard reason, without deterioration in the noblest part of our nature. (1,168-9)

It seems to be a case of "damned if you do, damned if you don't." We can say that, given his provenance, it would be odd indeed if Darwin did not share some of the social prejudices of his class. The Wedgwoods made their fortune by treating their workers, all fifteen thousand of them, like machines. But also, given his provenance, it would be odd indeed if Darwin, as squire of his village in all but name, felt no compassion or duty to those in need. This is the man who contributed to the Downe coal and clothing club for the needy in winter. (For several years, he was the treasurer.) Darwin felt the tug each way, and so we can readily understand why he found that natural selection pointed to reasons that we have this conflict. *Prima facie* this all sounds a bit like Huxley. But Huxley thinks our moral sense is entirely cultural, whereas Darwin thinks it is a biological, selection-caused adaptation. Very different positions. For Huxley, morality is rational. For Darwin, there is absolutely no overriding reason why substantive ethics should be consistent. What works is what works.

This is a good point to leave our straight exposition of Darwin and his theory. To end this essay, let me choose one topic to justify my claim that Darwin's theory remains highly relevant, especially with respect to social issues today.

The Jews

Repeatedly Darwin was caught in the prejudices of the Victorian era. "The chief distinction in the intellectual powers of the two sexes is shewn by man attaining to a higher eminence, in whatever he takes up, than woman can attain—whether requiring deep thought, reason, or imagination, or merely the use of the senses and hands" (1871, 2, 327). If one drew up a list of six male and six female philosophers, "the two lists would not bear comparison." Yet, his theory had the seeds that led to their refutation. Most pertinently – natural selection! Which point is a good opening to add a short discussion of the Jews, for prejudice towards them – antisemitism – is properly judged to be a matter of ingroup versus nongroup, whether this is a matter of nationality or of race or some combination of the two. What one can say is that it is a matter of longstanding and evil intent. In Clifford's Tower, in the City of York, on March 16, 1190, 150 Jews were trapped and massacred. (Most committed suicide rather than be killed.) Coming rapidly down to the present, we have the final solution and Auschwitz. Today, antisemitism has not vanished, as the United States shows depressingly repeatedly, most recently in demonstrations against Israel over its fraught relationships with Arabs.

If biblical justification is sought, the Gospel of Saint John – in the context of the Jews urging the Romans to crucify Jesus – is a common resource.

> 8 44 Ye are of your father the devil, and the lusts of your father ye will do. He was a murderer from the beginning, and abode not in the truth, because there is no truth in him. When he speaketh a lie, he speaketh of his own: for he is a liar, and the father of it.
>
> 45 And because I tell you the truth, ye believe me not.
>
> 46 Which of you convinceth me of sin? And if I say the truth, why do ye not believe me?
>
> 47 He that is of God heareth God's words: ye therefore hear them not, because ye are not of God.

Overall, Darwin was not terribly interested in the Jews. In common with his class, we get the odd comment about Jews and money, and – most notably – he added his signature to a letter protesting the persecution of Jews in Russia.

> To the Right Hon. the Lord Mayor of the City of London.
>
> My Lord:

> We, the undersigned, consider that there should be a public expression of opinion respecting the persecution which the Jews of Russia have recently and for some time past suffered. We therefore ask your lordship to be so good as to call, at your earliest convenience, a public meeting for that purpose at the Mansion House, and that you will be good enough to take the chair on the occasion
>
> (Letter dated January 21, 1882)
>
> [Co-signers included the Archbishop of Canterbury and Cardinal Henry Manning.]

Darwin was certainly not one who thought that Jews are significantly the "other."

Is that still our thinking today? One can certainly agree that Darwin's theory of evolution through natural selection in no way supports antisemitism of the ferocity found in the Third Reich. To the contrary, it furnishes strong evidence against it. In the *Descent*, there are no claims of fundamental biological superiority. The same is true of claims of biological inferiority. The important theme is our shared distance from the apes. But is this enough to negate all possible differences? Shylock, in the *Merchant of Venice*, is recognizably a Jew, and that is not exactly regarded as to his advantage. Indeed, at the end of the play, he converts to Christianity! Unsurprisingly, the play was much performed under the Third Reich. Does any of this relate to possible Jew-Gentile (biological) differences? There is not much variation, but there is some variation. A much-discussed study (of humans in general) found that there are some consistent genetic correlations separating specific groups. For instance, according to lore and language similarity, the somewhat isolated Kalash in northern Pakistan have origins linking them to Europeans, and genetics backs this up. "Genetic clusters often corresponded closely to predefined regional or population groups or to collections of geographically and linguistically similar populations" (Rosenberg *et al.* 2002, p. 2384). As a Darwinian would expect, where it exists systematically, one can look profitably for selection-producing adaptation.

And yet, to answer the question that everyone wants answered, where there is selection-fueled variation, intelligence differences are notable for their absence. "Yes, some humans are "smarter" than others, or better at doing certain things. That is only to be expected. But although "intelligence" is a prized quality that has repeatedly been mentioned in connection with "race," it is something that has proven impossible to measure satisfactorily, not only because it is so complex and multidimensional, but because it is so tied up with culture, social stratification, and economics. Notions of race do nothing to help clarify this complex situation" (Tattersall 2022, pp. 133-134).

Behind all these discussions about intelligence lie the supposed connection between brain power and skin color. Skin color does not occur by chance. It is adaptive, a function of the distribution of pigment melanin, and from a Darwinian perspective makes perfectly good sense. A darker skin protects from ultraviolet radiation, a big problem in Africa. Especially given that humans have, as compared to apes, evolved towards hairlessness, perhaps in part because of Darwin's suggestion of sexual selection, but mainly because sweating (as noted, an important adaptation for animals living out on the savannah rather than in trees) becomes far more efficient: "an explanation based on natural selection for enhanced thermoregulation during high physical activity levels under conditions of high environmental heat load" (Jablonski & Chaplin 2017, p. 2). However: "Loss of body hair was accompanied by disadvantages, notably, loss of some protection against abrasion and ultraviolet radiation (UVR). Compensatory changes evolved quickly in hominin skin." Humans changed in the direction of dark skins (1.2 mya). Subject to the possibility of reverse change. Remarkably, it seems that in the case of Europeans, the major changes came 12,000 years ago. In the absence of strong sunlight, white skin does a better job of vitamin D synthesis – invaluable for those ongoing dark days of Northern Europe. Whatever later cultural overlays there may be, we are not talking here about brute intelligence or anything like that. (Asians have light skin, but the genetic mechanisms are different from those of Europeans.)

In the case of the Jews, the genetic differences between groups, as well as between Jews and Gentiles, are strong enough that plausible hypotheses can be made about the history of Jewish wandering over the past three millennia. "Early population genetic studies based on blood groups and serum markers provided evidence that most Jewish Diaspora groups originated in the Middle East and that paired Jewish populations were more similar genetically than paired Jewish and non-Jewish populations" (Ostrer & Skorecki 2013, p. 120). Thus, for instance:

> it was observed that the Jewish populations of Europe, North Africa, and the Middle East formed a tight cluster that distinguished them from their non-Jewish neighbors [...]. Within this central cluster, each of these Jewish populations formed its own subcluster, in addition to the more remote localization of members of some Diaspora communities. (p. 121)

Expectably, the genes often showed that differences were related to the somewhat randomly chosen founders of populations: "Analysis of Jewish mitochondrial genomes in some Diaspora communities has demonstrated limited genetic diversity and therefore, evidence for strong founder effects." (p. 123) Also, the timespans of co-living with gentiles gave evidence of rates and sources of interbreeding. "A high degree of European admixture (30–60 %) was observed among Ashkenazi, Sephardic, Italian and Syrian Jews. The North African Jewish groups demonstrated North African and Middle Eastern admixture with varying European admixture." (p. 122)

All very interesting (and plausible). Are there any implications of significant differences, possibly adaptive? It is well known that some diseases are more common in some groups than in other Jewish groups, not mention non-Jewish populations. Jewish physicians and scientists have been the leaders in this work. Tay-Sachs disease, far more common in Ashkenazi Jews, is the best-known example. There is no evidence, however, that this is other than a misfortune with no connection to biologically caused adaptive advantage. For the rest, any significant systematic differences are much more plausibly cultural than genetic. There simply has not been enough time for natural section to promote adaptively advantageous features, apart from the fact that Jews and Gentiles have generally similar environments. Disraeli and Gladstone – British prime ministers in the second half of the nineteenth century, the former Jewish and the latter Gentile – both sat on the front benches of the same Houses of Parliament. There were certainly differences between the men, for a start the former was Conservative and the latter Liberal, and for a second Queen Victoria loved Disraeli and loathed Gladstone. But it is hard to see why the genes had much to do with any of this. Culture is somewhat different and could tear groups apart. To take Darwin's example of Jews and money, if there are differences – Jews more careful with/obsessed by money – better to turn to the New Testament for an answer. Usuary was forbidden to Christians. Luke 8:

> 34 And if ye lend to them of whom ye hope to receive, what thank have ye? for sinners also lend to sinners, to receive as much again. 35 But love ye your enemies, and do good, and lend, hoping for nothing again; and your reward shall be great, and ye shall be the children of the Highest: for he is kind unto the unthankful and to the evil.

Christians, however, could get Jews to do their dirty business, and so they did.

Conclusion

All told, Darwinian theory gives little support even to relatively mild genetically based Jewish-Gentile behavioral or like differences. It does invite one to explore the role of possible cultural factors. And with that optimistic suggestion, let us bring our discussion to an end. I do not expect that I have converted all of those with doubts about Darwin's theory, but I do hope I have whetted appetites and all will hunt for more pertinent evidence.

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