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Darwinism and Victorian Values: Threat or Opportunity?

PETER J. BOWLER
The Queen's University of Belfast

POPULAR understanding of the 'Darwinian Revolution' is dominated by the metaphor of a war between science and religion. We are used to being told that Darwin's theory was perceived as a threat to the religious values that most Victorians accepted as the moral foundations of their society. The claim that we had evolved from the apes would undermine the assumption that the world of moral and spiritual values existed independently of material nature. The most popular expression of this image of conflict is the confrontation between 'Darwin's bulldog,' Thomas Henry Huxley, and Bishop Samuel Wilberforce at the Oxford meeting of the British Association for the Advancement of Science in 1860. Huxley is supposed to have triumphed over the bishop's efforts to discredit Darwinism and thus hold back the march of scientific rationalism. From the viewpoint of a rationalist, of course, this was a good thing – yet our interpretation of late-Victorian thought is also influenced by another image of conflict which paints a less rosy picture of Darwin's impact. It is claimed that for some Victorians, at least, the philosophy of 'social Darwinism' legitimized the replacement of traditional values with the worship of brute force and success at any price.

The vested interests which underlie these conflicting interpretations are obvious enough. Scientists want to see Darwinism as a symbol of modern humanity's ability to throw off the shackles of outdated superstition and face up to the harsh realities of nature. Some religious thinkers want to

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brand the theory as a symptom of the materialism that is undermining the traditional fabric of society. But as with most cases in which historical myths are used to support modern values, the familiar images begin to blur when the past is studied in more detail. The history of science is a relatively new discipline, but it has taken upon itself the task of exposing the mythological dimension of the classic stories about the 'heroes of discovery.' At the same time, a growing awareness of the ideological divisions within Victorian society has allowed us to see that there were many different ways of responding to the challenge of evolutionism. Historians of science have uncovered the ideological dimensions of the Victorian debate over Darwinism with as much gusto as they have explored the details of Darwin's biological work.[1]

In this paper I want to survey the results of a decade or more's work both by the 'Darwin industry' and by social historians seeking to create a more sophisticated picture of the complex process by which evolutionism acquired its role as one of the most powerful themes in late-Victorian thought. I shall argue that, far from being merely a threat to conservative values or an opportunity for the exponents of ruthless capitalism, evolutionism was taken up in many different ways and used for many different purposes. Instead of looking for a monolithic 'Darwinism' which had to be either rejected or accepted as a whole, we must recognize that *evolutionism* succeeded precisely because it could be adapted to many different social purposes. There were several different varieties of Darwinism, and also many non-Darwinian versions of evolutionism, each with its own set of moral and social consequences. In some cases, models of evolutionary progress that owed very little to Darwin's thought were able to exploit the idea of the 'struggle for existence' to create what looks like a form of social Darwinism.

One casualty of the historians' efforts to undermine traditional myths has been the Huxley-Wilberforce debate of 1860. Several studies have now shown that the popular image of Huxley wiping the floor with the bishop is a product of the scientists' wishful thinking.[2] In fact many of those who attended the debate did not think that the evolutionists had carried the day. But this cautionary tale should not mislead us into overestimating

[1] For surveys of recent developments in the history of evolutionism see Peter J. Bowler, *Evolution: The History of an Idea* (Berkeley: University of California Press, 2nd edn 1989); for a reassessment of the 'Darwinian Revolution' see Bowler, *The Non-Darwinian Revolution: Reinterpreting a Historical Myth* (Baltimore: Johns Hopkins University Press, 1988).

[2] See for instance J. R. Lucas, 'Huxley and Wilberforce: A Legendary Encounter', *Historical Journal*, **22** (1979), 313–30 and J. V. Jensen, 'Return to the Wilberforce-Huxley Debate', *British Journal for the History of Science*, **21** (1988), 161–80.

the long-term opposition to the general idea of evolution. There are many surveys of the debate both in science and in society at large, and they almost all agree that by the late 1860s the tide had set very firmly in the evolutionists' favour.[3] Whatever their initial doubts, most Victorians – including those of more conservative opinions – gradually came to accept the general concept of evolutionism.

Whether they accepted Huxley's version of Darwinism is, however, another matter. There now seems little doubt that Huxley used Darwin's theory as a weapon in his campaign to take control of the scientific community. At the same time he was able to forge an alliance with the liberal social evolutionism being promoted by Herbert Spencer, which corresponds to the classic image of social Darwinism. Since this invoked many aspects of the Protestant work ethic as the driving force of progress, some religious thinkers were able to accommodate themselves to evolutionism by following its lead. We now know that neither Huxley nor Spencer were good Darwinians as measured by their acceptance of Darwin's most innovative ideas – yet their efforts to publicize evolutionism determined what most people thought 'Darwinism' ought to be. At the same time there were several efforts being made to create non-Darwinian versions of evolutionism that would salvage some aspects of the traditional world view. These have often been dismissed as blind-alleys in the development of science, but we now know that they played an important role in late-Victorian evolutionary thought.

The Evolutionists' Challenge

The traditional story of the Darwinian revolution is based on the assumption that the *Origin of Species* assaulted Victorian sensibilities like a bolt from the blue. There was no warning, because there had been no serious attempt to float a theory of biological evolution in the earlier decades of the nineteenth century. The work of scholars such as Adrian Desmond and James Secord has exploded this myth by showing that evolutionism *was* debated both inside and outside science in the decades before Darwin. It is appropriate in a paper delivered originally in Edinburgh to record that the leading figures in the pre-Darwinian evolutionary movement were the

[3] See especially Alvar Ellegard, *Darwin and the General Reader: The Reception of Darwin's Theory of Evolution in the British Periodical Press. 1859–1872* (Göteburg: Acta Universitatis Gothenburgensis, 1957, reprinted Chicago: University of Chicago Press, 1990).

Scots anatomist Robert Edmond Grant and the publisher and writer Robert Chambers. In the 1820s and 30s, Grant promoted radical evolutionism as part of a campaign to reform both the medical profession and society at large.[4] The new transformism pioneered by French biologists such as J. B. Lamarck and Etienne Geoffroy Saint-Hilaire exposed the outdatedness of establishment science and provided a model of natural development which could be used to justify demands for social progress through the removal of an outdated power structure. When Grant moved to London in 1827, the English medical establishment took great pains to isolate him. The anatomist Richard Owen rose to prominence because he was able to 'modernize' the old natural theology and use the discontinuity of the fossil record to block Grant's claims.

Grant fell into obscurity, but it is possible to see Robert Chambers' anonymously published *Vestiges of the Natural History of Creation* of 1844 as an attempt to popularize radical transformism south of the border.[5] To make it seem more palatable to an audience used to thinking in terms of design by God, Chambers presented evolution as the progressive unfolding of a divine plan of creation, advancing steadily toward ever higher states of development. His theory was certainly not an anticipation of Darwin's: it took progress rather than adaptation as its starting point, and made no attempt to suggest a naturalistic mechanism of change. Even so, Secord has shown that Chambers saw the idea of progress as part of a political campaign. He wanted to throw off the shackles of traditional authority so that active, middle-class entrepreneurs could push society toward new levels of activity.

If the conventional story of the Darwinian revolution mentions Chambers at all, it is as an amateur whose wild speculations were shunned by the scientific community. It is true that many conservative naturalists spoke out against *Vestiges*, but the evidence suggests that the book had a much greater impact than was once supposed. Even Owen refused to criticize it in print, and in the late 1840s wrote vaguely about a law of creation operating by natural rather than supernatural means:

> To what natural laws or secondary causes the orderly succession and progression of such organic phenomena may have been committed we

[4] See Adrian Desmond, *The Politics of Evolution: Medicine, Morphology, and Reform in Radical London* (Chicago: University of Chicago Press, 1989).

[5] See James Secord, 'Behind the Veil: Robert Chambers and the Genesis of the *Vestiges of Creation*', in J. R. Moore (ed.), *History, Humanity and Evolution: Essays for John C. Greene* (Cambridge: Cambridge University Press, 1989), pp. 165–94. On the non-Darwinian character of Chambers' theory see M. J. S. Hodge, 'The Universal Gestation of Nature: Chambers' Vestiges and *Explanations*', *Journal of the History of Biology* **5** (1972), 127–52.

> are as yet ignorant. But if, without derogation of the Divine power, we may conceive the existence of such ministers, and personify them by the term 'Nature,' we learn from the past history of our globe that she has advanced with slow and stately steps, guided by the archetypical light, amidst the wreck of worlds, from the first embodiment of the Vertebrate idea under its Ichthyic vestment, until it became arrayed in the glorious garb of the human form.[6]

Owen did not follow this suggestion up in the years before the *Origin of Species* appeared, and when he did begin to speak openly about transmutation, it was in a distinctly non-Darwinian form (see below). But his brief concession suggests that long before Darwin published, conservative attitudes were beginning to soften.

This is confirmed by Pietro Corsi's recent study of the Oxford mathematician and philosopher of science Baden Powell.[7] In his *Essays on the Spirit of the Inductive Philosophy* of 1855, Powell argued that God's influence over nature was demonstated more effectively through the laws He had imposed than through any miraculous interference with those laws – and explicitly extended the argument to the appearance of new species. His comments suggest that liberal Anglicans had begun to think seriously about the idea of evolution in the 1850s. At one level, Chambers had spiked his opponents' guns by showing that transmutation could indeed become part of natural theology; God might create new species by a predetermined law rather than by miracle. What was *not* acceptable to the Anglican establishment was the linear progressionism of Chambers' theory, which reduced mankind to the last step in the continuous ascent of the animal kingdom. Evolution would be acceptable only if it could be divorced from the idea of continuous progress – a topic I shall return to later.

From the perspective of the radical exponents of free-enterprise individualism, however, Chambers' had abandoned a vital component of the evolutionary model. For them, progress had to be the cumulative result of many individual acts of self-improvement, not a preordained law imposed from on high. The man who did most to develop this model of evolution was, of course, Herbert Spencer. Already in the early 1850s Spencer was advocating both *laissez-faire* individualism as the key to social progress and

[6] Richard Owen, *On the Nature of Limbs* (London: van Voorst, 1849), p. 89. On Owen's attitude to evolution see Evelleen Richards, 'A Question of Property Rights: Richard Owen's Evolutionism Reassessed', *British Journal for the History of Science*, **20** (1987), 129–72. See also Adrian Desmond, *Archetypes and Ancestors: Palaeontology in Victorian London, 1850–1875* (London: Blond and Briggs, 1982).

[7] Pietro Corsi, *Science and Religion: Baden Powell and the Anglican Debate, 1800–1860* (Cambridge: Cambridge University Press, 1988); see Baden Powell, *Essays on the Spirit of the Inductive Philosophy, The Unity of Worlds, and the Philosophy of Creation* (London: Longmans, 1855).

biological evolution based on the Lamarckian mechanism of the inheritance of acquired characteristics.[8] Lamarckism had always been associated with progressionism, and Spencer seems to have realized that it offered the perfect parallel to the individualist model of social progress. Animals (and human beings) acquired new habits to cope with new environments, the new habits generated new bodily structures through exercise and effort, and these acquired characters were inherited to become the foundation for the species' evolution. Progress was inevitable in the long run because animals were always having to develop their intelligence and initiative in order to cope with an ever more challenging environment.

This was the model for biological and social evolution that Spencer was already promoting in the late 1850s. Although he has been presented as a leading 'social Darwinist'[9] Spencer was really a Lamarckian and he defended this theory vigorously in the biological debates of the late nineteenth century.[10] He certainly adopted Darwin's mechanism of natural selection once it was published – indeed it was Spencer who coined the term 'survival of the fittest' – but for him this was always a secondary mechanism, removing those individuals who were incapable of self-development. The emphasis was on struggle as the spur to self-improvement, not primarily as a means of eliminating the congenitally unfit. I suspect that many people actually found it very difficult to distinguish between the two processes of Lamarckism and natural selection, at least until the biological developments of the late nineteenth century began to focus much more attention on to the problem of heredity. Much of what has passed for 'social Darwinism' was actually Spencerianism, in which the Darwinian mechanism played only a subsidiary part. The term 'Darwinism' was attached to it because it was Darwin, not Spencer, who had actually converted the scientists to evolutionism.

The problem with Spencer's philosophy was that it offered no new initiative on the scientific front. Lamarckism had been blacklisted in the earlier debates, and few scientists were prepared to see it as the basis for rethinking the whole framework of biology. Some preferred to talk vaguely about 'creation by law,' but those of a more radical disposition

[8] See J. D. Y. Peel, *Herbert Spencer: The Evolution of a Sociologist* (London: Heinemann, 1971). There is no good modern account of Spencer's biological evolutionism, but for an amplification of the point made here see Bowler, *The Non-Darwinian Revolution* (note 1), pp. 38–40 and 64–6.

[9] Spencer is presented as a social Darwinism in Richard Hofstadter's *Social Darwinism in American Thought* (revised edn, Boston: Beacon Press, 1959); for a contrary view see Robert Bannister, *Social Darwinism: Science and Myth in Anglo-American Social Thought* (Philadelphia: Temple University Press, 1979).

[10] For Spencer's defence of Lamarckism see his *Factors of Organic Evolution* (London: Williams and Norgate, 1887).

felt that the whole situation had become deadlocked. This is very clear in the attitude of the young T. H. Huxley, desperately trying to find himself a niche in the very small world of professional science in the 1850s. Huxley was determined to promote science as a key component of the new industrialized society, and he despised those who used natural theology to keep science subservient to religion. He attacked Chambers' *Vestiges* savagely because he regarded its appeal to a divinely-implanted law of progress as mere pseudo-science.[11] Yet he could see no way of developing a truly naturalistic evolutionism. The *Origin of Species* was a revelation to him, not because he accepted the idea of natural selection unreservedly (indeed he had major reservations about it), but because it showed that science could enter the hitherto restricted area of theorizing about natural relationships.[12]

Meanwhile, what of Darwin himself? It is impossible to summarize here the vast amount of scholarly analysis that has been devoted to uncovering the path by which he developed his theory.[13] Almost all commentators now agree that his notebooks reveal a theory emerging from a dialogue between his scientific interests in biogeography and reproduction, and his concerns about the human implications of his ideas.[14] Darwin's theory became much more sophisticated in the course of the 1840s and 50s, but he realized that to make it acceptable to the general public, he must give it a gloss that would neutralize the prevailing moral concerns. This was particularly important because natural selection emphasized the harshness of nature and provided no obvious means by which the Creator could be said to guide evolution along a chosen path.

There has been much controversy on the question of whether or not

[11] See [T. H. Huxley], 'Vestiges of the Natural History of Creation', *British and Foreign Medico-Chirurgical Review*, **13** (1854), 332–43.

[12] For Huxley's own assessment of his response to Darwinism see his 'On the Reception of the "Origin of Species"', in Francis Darwin, (ed.), *The Life and Letters of Charles Darwin* (London: John Murray, 1887, 3 vols), vol. 2, 179–204. See Desmond, *Archetypes and Ancestors* (note 6) and Mario T. Di Gregorio, *T. H. Huxley's Place in Natural Science* (New Haven: Yale University Press, 1984).

[13] For a survey see David Oldroyd, 'How Did Darwin Arrive at his Theory?', *History of Science*, **22** (1985), 325–74. The best collection of modern Darwin scholarship is David Kohn (ed.), *The Darwinian Heritage* (Princeton: Princeton University Press, 1985). See also Peter J. Bowler, *Charles Darwin: The Man and his Influence* (Oxford: Basil Blackwell, 1990).

[14] There is now a splendid edition of the notebooks edited by Paul H. Barrett *et al.*, *Charles Darwin's Notebooks, 1836–1844* (London: British Museum (Natural History) and Cambridge: Cambridge University Press, 1987). At the time of writing, the project to reprint Darwin's correspondence has reached its sixth volume: Frederick Burckhardt and Sydney Smith (eds), *The Correspondence of Charles Darwin* (Cambridge: Cambridge University Press, 1984–90).

Darwin was a progressionist in the Spencerian mould. As modern biologists understand his theory, its concentration on migration and adaptation as the driving forces of evolution makes it the very antithesis of linear progressionism. For Darwin, evolution had to be a tree rather than a ladder, and each branch of the tree had to be seen as evolving in its own particular way. To measure progress in one branch by standards based on another was inappropriate. When Darwin was wearing his biologist's hat he recognized these implications, and much of his later scientific work was devoted to studying the minute details of adaptation. But when he became a social philosopher Darwin was much more likely to talk in progressionist terms. He realized that it was important for him to present the *Origin of Species* both as a new initiative in science and as a contribution to progressionism. This is evident from the optimistic message of its closing passages:

> Thus, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is a 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.[16]

The *Origin of Species* had an immediate impact. Darwin offered new lines of evidence for adaptive evolution as well as a new mechanism of change, and it seems that these were both important in convincing many biologists that it was now time to take the general idea of evolution seriously. Whatever the strength of feelings raised by the debates of the early 1860s, surveys of both the scientific and popular literature suggest that by the end of the decade evolutionism was being taken largely for granted. The scientific breakthrough catalysed a dramatic change in popular opinion on the question – which had already been primed by writers such as Chambers and Spencer.

But we now know that Darwin's particular theory of natural selection did not gain a firm foothold even within science. Some biogeographers took it very seriously, including the botanist J. D. Hooker and the co-discoverer of the selection mechanism A. R. Wallace. But the most active area of evolutionary science was the reconstruction of the ancestral tree of life, and here natural selection was of little relevance. This was Huxley's field, and thanks to the work of Mario Di Gregorio, Adrian

[16] Charles Darwin, *On the Origin of Species by Means of Natural Selection* (London: John Murray, 1859), p. 490.

Desmond and others, we now know just how complex Huxley's reaction to Darwinism was.[17] He saw natural selection as merely an interesting suggestion that might be worth following up, and preferred to believe that transmutation occurred through predetermined variations forcing a species in a fixed direction.[18] As a scientist, Huxley was certainly not a very good Darwinian.

Why, then, did he champion Darwin's cause so actively? The answer to this question lies in Huxley's determination to use evolutionism as a vehicle for galvanizing the scientific community into activity. By throwing off the shackles of natural theology, science would take its place as a leading force in a progressive, industrialized society. Evolutionism based on the assumption that development was a natural process would symbolize science's bid to replace religion as the source of authority in the modern world. It was *evolutionism* that Huxley really wanted – and he was prepared to call himself a 'Darwinian' despite his reservations about natural selection because he realized that the *Origin of Species* served as the movement's figurehead. He was immensely successful in playing the political game within the scientific community which ensured that suporters of the new approach were placed in positions of power and influence.

At the same time, Huxley was concerned about social reform and saw evolution in biology as a useful model upon which to base his assurances that the machinery of government would be steadily improved. He was thus able to throw in his lot with Spencer and the advocates of social evolutionism. Spencer was also a member of the informal 'X-club,' the group which masterminded the Darwinian takeover of the scientific community.[19] For the time being, at least, Huxley's scientific Darwinism went hand in hand with Spencer's social evolutionism – although Huxley would turn against Spencer's optimistic philosophy in the 1890s.[20] Advocates of the free-enterprise system were thus able to climb aboard the Darwinian bandwaggon – although the term 'social Darwinism' would not be invented for several decades yet. As Jim Moore has shown in his survey of the religious debates, many nonconformists were able to absorb Spencer's evolutionary philosophy because it represented merely a

[17] See note 10.

[18] See Huxley's 1871 article, 'Mr. Darwin's Critics', reprinted in Huxley, *Collected Essays* (London: Macmillan, 1893–94, 9 vols), vol. 2, *Darwiniana*, 120–86, pp. 181–2 and his 1878 'Evolution in Biology', reprinted ibid., 187–226, p. 223.

[19] See Roy MacLeod, 'The X-Club: A Scientific Network in Late-Victorian England', *Notes and Records of the Royal Society*, **24** (1970), 305–22.

[20] Huxley's later opposition to Spencer's progressionism was developed in his 1893 lecture 'Evolution and Ethics', reprinted in *Collected Essays* (note 18), vol. 9, *Evolution and Ethics*. 46–116.

naturalistic interpretation of the Protestant work ethic.[21] In the new scheme of things, thrift and initiative would be rewarded in this world as well as the next, as part of nature's steady advance toward higher things.

The model of development along a progressive scale brought about by the accumulated effects of individual effort was used throughout the social and natural sciences. Darwin's emphasis on the branching character of evolution was suppressed by implying that the tree of life had a central trunk defining the ladder of progress toward mankind. In archaeology, the linear scale of stone-age cultures erected by Gabriel De Mortillet dominated the study of prehistory.[22] Anthropologists followed Edward B. Tylor in postulating a scale of cultural evolution to be seen among living societies.[23] The most primitive savages corresponded to the early stages in the evolution of higher cultures – they were frozen relics of the past, preserved because they had never been exposed to the more stimulating environment of the temperate regions. The belief that progress only occured in response to an environmental challenge fitted Spencer's Lamarckian view of evolution as an extension of self-development. It also offered an easy way of explaining why the lower points on the scale could still be seen in the world today. Where geographical diversity had pushed Darwin towards the model of an open-ended tree, here it was subordinated to the notion of a historical scale.

In biology these themes can be seen in the work of one of Huxley's protégés, the zoologist E. Ray Lankester.[24] Although ostensibly a Darwinian, Lankester's view on variation and heredity were vague enough to leave room for a Lamarckian interpretation. And although he warned about the dangers of picturing evolution as a ladder rather than a tree, he defined the grade of all the major groups of animals in terms of the point at which they branched off a main trunk leading toward mankind. Lankester did, however, modify the concept of progress through

[21] See James R. Moore, *The Post-Darwinian Controversies: A Study of the Protestant Struggle to Come to Terms with Darwin in Great Britain and America, 1870–1900* (New York and Cambridge: Cambridge University Press, 1979) and Moore, 'Herbert Spencer's Henchmen: The Evolution of Protestant Liberals in Late-Nineteenth-Century America', in J. Durant (ed.), *Darwinism and Divinity* (Oxford: Basil Blackwell, 1985), pp. 76–100.

[22] Gabriel De Mortillet, *Le Préhistorique* (Paris: Reinwald, 1883). On De Mortillet's influence see Peter J. Bowler, *Theories of Human Evolution: A Century of Debate, 1844–1944* (Baltimore: Johns Hopkins University Press and Oxford: Basil Blackwell,. 1986), part 1 and Bowler, *The Invention of Progress: The Victorians and the Past* (Oxford: Basil Blackwell, 1989), part 2.

[23] On evolutionism in anthropology see J. W. Burrow, *Evolution and Society: A Study in Victorian Social Theory* (Cambridge: Cambridge University Press, 1966); and George W. Stocking, *Victorian Anthropology* (New York, Free Press, 1987).

[24] On Lankester's work see Peter J. Bowler, 'Development and Adaptation: Evolutionary Concepts in British Morphology, 1870–1914', *British Journal for the History of Science*, **22** (1989), 283–97.

struggle in an interesting way. As a biologist he was aware that some simple animals are not primitive relics of early stages in evolution. They are, in fact, the end-products of lines of evolution which have degenerated because they have adopted a softer, less challenging lifestyle. In an address given to the British Association for the Advancement of Science in 1879 he compared this process with the degeneration of human cultures when they had dominated their surroundings too effectively and had removed the stimulus for further progress.[25] It is probable that Lankester's ideas formed the basis for the picture of future human degeneration in H. G. Wells' story *The Time Machine* of 1895.[26]

The notion of progress through struggle thus had a darker side that could be brought out by anyone who realized that the relaxation of struggle would produce the reverse effect. But for Lankester and most of his contemporaries this was only an occasional aberration from the main theme of progress. From this point of view, evolutionism offered an opportunity to present progress as the cumulative effect of individual effort. The fact that this missed what modern biologists see as the most crucial insights in Darwin's thinking should not blind us to the fact that to the Victorian mind, 'Darwinism' almost inevitably carried this progressionist implication. Darwin's ideas about the struggle for existence were close enough to Spencer's mechanism for them to be absorbed – with Darwin's connivance – into the ideology by which the middle classes hoped to justify their rise to power. Darwin became the figurehead of popular evolutionism because his theory catalysed the transformation of the scientific community, and could also be adapted to popular tastes. It is one of the ironies of history that this process of adaptation concealed what modern biologists regard as the most important implications of his theory.

The Conservative Response

The Huxley-Wilberforce confrontation may easily mislead us into thinking that the conservative opponents of *laissez-faire* progressionism found the idea of evolution unacceptable. They certainly found the model of progress by the accumulation of individual effort unacceptable, but Chambers had

[25] E. Ray Lankester, *Degeneration: A Chapter in Darwinism* (London: Macmillan, 1880), pp. 59–61.

[26] Shortly before beginning work on *The Time Machine*, Wells wrote a popular article on 'Zoological Retrogression' which borrows many of Lankester's themes; it is reprinted in R. M. Philmus and D. Y. Hughes, (eds), *H. G. Wells: Early Writings in Science and Science Fiction* (Berkeley: University of California Press, 1975), pp. 158–68. See Peter J. Bowler, 'Holding Your Head Up High: Degeneration and Orthogenesis in Theories of Human Evolution', in Moore (ed.), *History, Humanity and Evolution* (note 5), pp. 329–53.

already shown how it was possible for transmutation to be seen as the unfolding of a divine plan. If evolution were subject to built-in trends that pushed it in a certain direction whatever the behaviour of the individual organisms, the Darwinian-Spencerian interpretation would be undermined. If the element of continuity in this model of change could also be undermined, it might be possible to create a theory of evolution in which progress was confined to occasional episodes during which life advanced suddenly on to an entirely new plane. This would have the advantage of preserving a gap between the human race and the rest of the animal kingdom. Progress would occur in cycles, each one beginning with the injection of something new into the world, and then continuing along its own inexorable path until replaced by the next upward step.

The analogy between this cyclic theory of evolution and certain models of human history is obvious enough – and I believe that the similarity is not accidental. Those biologists who rejected the Darwinian initiative were exploiting an alternative model of historical development that was already well-developed outside science. They were thus able to create non-Darwinian theories of evolution which preserved the view that the world is governed by something more than individual acts of selfishness.

We can well appreciate how the cyclic model of progress could be revived in the late-Victorian era as the foundation for a more self-conscious imperialism based on the idea of racial or national destiny. What is less well-known is that the equivalent non-Darwinian model of evolution gained considerable strength within biology in the later decades of the nineteenth century. Far from continuing its domination of science, Huxley's Darwinism was gradually overtaken by rival theories. During what Julian Huxley (T. H.'s grandson) called the 'eclipse of Darwinism' at the turn of the century, theories of nonadaptive evolution were widely endorsed.[28] In the early years of the twentieth century they were extended into human prehistory to become the basis for an ideology of racial struggle which is often, somewhat confusingly, referred to as yet another version of 'social Darwinism.' In fact, these theories were the product of an interlude separating the original Spencerian version of Darwinism from the synthesis of natural selection and Mendelian genetics in the 1920s and 30s which created modern Darwinism.

[28] See Bowler, *The Eclipse of Darwinism: Anti-Darwinian Evolution Theories in the Decades around 1900* (Baltimore: Johns Hopkins University Press, 1983).

In the early Victorian era, the cyclic model of development was incorporated into what has been called the 'liberal Anglican' view of history developed by Thomas Arnold.[29] For Arnold, each civilization goes through a cycle of progress through to maturity, followed by decline and decay. If there was overall progress, this was because certain civilizations were able to build on cultural foundations established by their predecessors. As developed by Charles Kingsley, this became the basis for the claim that modern Christianity represents the outcome of a unique sequence of events planned by God. Greece and Rome each went through its cycle of maturity and decline in order to pass on to Western Europe certain traditions that could only be fully developed when combined with the Teutonic love of freedom.[30] A similar model was proposed by philologists such as Max Müller, who saw the development of European languages as the product of successive waves of Aryan invaders coming in from the East.[31] Archaeologists too saw bronze and iron technologies as the products of new and more highly-civilized peoples invading Europe from a souce of inspiration in central Asia. Progress was not the result of continuous self-development within single cultures, it occured through a series of waves, each representing the unique contribution of a particular race.[32]

This approach to history evaded the question of the true source of new cultures so as to give the impression that higher powers were somehow involved. The internal history of each nation or culture was bound by rigid laws of development that could not be used to predict the character of the next upward step. It is less well-known that similar models were used to interpret the fossil record as an alternative to the linear progressionism of Grant and Chambers. Richard Owen coined the term 'dinosaur' in his 1841 address on 'British Fossil Reptiles' to the British Association, and at the same time he emphasized the fact that the dinosaurs, although the earliest reptiles, were also the most advanced. The subsequent history of the class was a decline not a

[29] See Arnold's essay 'The Social Progress of States', which appears as appendix 1 to his edition of Thucydides, *History of the Peloponnesian War* (Oxford: S. Collingwood, 1830–35, 3 vols), vol. 1. More generally see Duncan Forbes, *The Liberal Anglican Idea of History* (Cambridge: Cambridge University Press, 1952) and J. W. Burrow, *A Liberal Descent: Victorian Historians and the English Past* (Cambridge: Cambridge University Press, 1981).

[30] See for instance Kingsley's *The Roman and the Teuton* (new edn, London: Macmillan, 1895).

[31] See J. W. Burrow, 'The Uses of Philology in Victorian England', in Robert Robson (ed.), *Ideas and Institutions of Victorian Britain: Essays in Honour of George Kitson Clark* (London: G. Bell, 1967), pp. 180–204.

[32] For more details on these developments see Bowler, *The Invention of Progress* (note 22), chap. 2.

progression.[33] In the 1840s similar ideas were used against Chambers' *Vestiges* by critics such as Hugh Miller: gradual progress was obviously wrong because the fossil record showed a series of sudden advances each followed by a decline:

> The general advance in creation has been incalculably great. The lower divisions of the vertebrata precede the higher; – the fish preceded the reptile, the reptile preceded the bird, and the bird preceded the mammiferous quadruped. And yet, is there one of these great divisions in which, in at least some prominent feature, the present, through this mysterious element of degradation, is not inferior to the past?[34]

For Miller, this irregular pattern of development suggested that the sudden appearance of each new class must be by miracle. But we have already noted that by the 1850s even Owen was beginning to suspect that the existence of law-like trends in the fossil record must imply preordained patterns of development. These were of divine origin, but they worked without the need for miraculous intervention. They also worked through a series of discontinuous cycles, making it clear that something more than mere individual effort was involved. In the 1860s Owen naturally took up an anti-Darwinian stance, but he was not – as has often been claimed – an outright opponent of evolution. Now that the general idea of natural development was becoming popular, Owen supported it, but made it clear that he saw evolution as the unfolding of built-in trends rather than the adaptation of individuals (or populations) to their environment.[35] On the question of human origins, he insisted that there was no simple linear trend leading to mankind. These points were developed further by St. George Jackson Mivart in his *Genesis of Species* of 1870 – one of the most powerful sources of anti-Darwinian arguments in biology.[36]

There can be no doubt that Owen and Mivart were outmanoeuvred by Huxley and the Darwinians, so that the scientific community was for a time dominated by a view of evolution that made fewer concessions to the idea of divine predestination. But in the later decades of the century the non-Darwinian view of evolution modernized itself to create a framework for a theory in which the cyclic model of development

[33] Richard Owen, 'Report on British Fossil Reptiles, Part 2', *Report of the British Association for the Advancement of Science*, 1841 meeting, 60–204. See Adrian Desmond, 'Designing the Dinosaurs: Richard Owen's Response to Robert Edmund Grant', *Isis*. **70** (1979), 224–34. More generally see Desmond's *Archetypes and Ancestors* (note 6) and Bowler, *The Invention of Progress* (note 22), chap. 6.

[34] Hugh Miller, *Footprints of the Creator: Or the Asterolepis of Stromness* (3rd edn, London: Johnston and Hunter, 1850), p. 179.

[35] For further details see Richards, 'A Question of Property Rights' (note 6), Desmond, *Archetypes and Ancestors* (note 6).

[36] On Mivart and his influence see Bowler, *The Eclipse of Darwinism* (note 28), chap. 3.

figured very strongly. Somewhat paradoxically, the supporters of this model appealed to Lamarckism as an alternative to natural selection when explaining adaptive evolution. Once dismissed as a radical heresy, Lamarckism now became acceptable to conservatives because it offered an alternative to the materialism of natural selection.

There is a sense in which the opponents of Darwinism, including the writer Samuel Butler, had a clearer idea of the implications lying behind selectionism than the pseudo-Darwinians of the Spencerian school. Butler's *Evolution, Old and New* of 1879 began a campaign against Darwinian materialism that would last into the 1890s.[37] Like Owen and Mivart, Butler was marginalized by the Darwinian group that had taken over science – but it is significant that his Lamarckian ideas were taken much more seriously in the later decades of the century. August Weismann's attack on Lamarckism, often seen as a prelude to modern genetics, was highly controversial during the 1890s. Somewhat paradoxically, Herbert Spencer and Samuel Butler spoke with once voice, at least in opposition to Weismann. For profoundly different reasons, they both wanted to preserve a role for individual effort and initiative in evolution. For Spencer, this corresponded to the activity of the individual humans who contributed to social progress, for Butler it represented a divine spark of creativity implanted in nature.

More directly relevant to my present theme is the preference of many anti-Darwinians for theories which assumed that the evolution of each group runs through a predetermined cycle paralleling the life-cycle of the individual organism. Instead of invoking divinely-implanted trends, palaeontologists assumed that the fossil record gave evidence of regularities that could not be explained in terms of random variation and adaptation to the local environment. The theory of 'orthogenesis' had its origins in the work of American palaeontologists such as Alpheus Hyatt. In studying the pattern of evolution in the Ammonites and other cephalopods, Hyatt was sure that he could detect an initial phase of progressive evolution (which he explained in Lamarckian terms) followed by a decline toward bizarre nonadaptive structures as a prelude to extinction. The origin of each new group was essentially mysterious, but once established each went through a predictable life-cycle of growth, maturity, senility and death.[38]

[37] See Samuel Butler, *Evolution, Old and New* (London: Harwick and Bogue, 1879). On Butler and the growing interest in Lamarckism toward the end of the century see Bowler, *The Eclipse of Darwinism* (note 28), chap. 4.

[38] Hyatt's earliest statement of his theory is his 'On the Parallelism between the Different Stages of Life in the Individual and Those in the Entire Group of the Molluscous Order Tetrabranchiata', *Memoirs of the Boston Society of Natural History*. **1** (1866), 193–209. On his version of the recapitulation theory see Stephen Jay Gould, *Ontogeny and Phylogeny* (Cambridge, Mass.: Harvard University Press, 1977), chap. 4; see also Bowler, *The Eclipse of Darwinism*, chaps 6 and 7, and *The Invention of Progress* (note 19), chap. 6.

By the end of the century this model of evolution was routinely being applied to the rise and fall of the dinosaurs and other groups. Far from portraying evolution as a linear process, it emphasized the existence of many parallel lines of development, each undergoing its own pattern of progress and decline. The origin of each new line was left unexplained, although it was clearly the result of a process quite unrelated to the normal trends exhibited by established groups. The fact that many lines of development had become exhausted and been replaced by younger, more vigorous types provided a parallel with the older cyclic model of history.

Although the link with natural theology was severed in the late Victorian era, this model of evolution provided a foundation for the vision of human history exploited by conservative imperialists. Those who saw the Anglo-Saxon nations as having a unique mission to dominate the world were naturally inclined to think in terms of the human races as having distinct origins. Instead of treating the races as stages in the evolution of a single type, they preferred to see each race as having its own origin, its own pattern of development, and its own destiny.

This view of race had gained ground among physical anthropologists in the 1860s and 70s, causing a rift with Tylor and the cultural anthropologists who favoured the linear model. There was a similar split in archaeology. Study of the palaeolithic (the old stone age) was dominated by advocates of De Mortillet's scheme of linear, indigenous cultural evolution, while the introduction of neolithic, bronze and iron technologies was attributed to the invasion of more developed races from the East. William Boyd Dawkins of Manchester was one of the few who challenged De Mortillet's scheme and insisted that the various palaeolithic toolmaking cultures were specific to distinct racial types. He explicitly invoked the philologists' image of a mysterious centre of progress in central Asia from which all the higher types of mankind had radiated one after another: '. . . the origin of domestic animals, as well as of the cereals, proves that the Neolithic peoples migrated into Europe from the South-east, from the mysterious birthplace of successive races, the Eden of mankind, Central Asia.'[39]

By the end of the century this more extreme view of racial differences was gaining ground in some quarters as a foundation for the ideology of imperial domination. By moving slightly beyond our designated period, we can see that it was extended to give a complete theory of human origins in the early years of the twentieth century. Boyd Dawkin's approach was revived in William Sollas' book *Ancient Hunters* of 1911 to provide an alternative to the linear model of development. According to Sollas, each

[39] W. Boyd Dawkins, *Early Man in Britain and his Place in the Tertiary Period* (London: Macmillan, 1880), p. 306; see Bowler *The Invention of Progress* (note 19), chap. 4.

palaeolithic culture belongs to a distinct race, the races constituting parallel and distinct branches of the human family tree. The pattern of human prehistory could be explained as a series of racial takeovers in which the more highly developed types of humanity expanded across the globe, marginalizing or exterminating the earlier types that preceded them.

I believe that this new interpretation of human evolution was an application of the cyclic model of development then gaining ground in palaeontology. One of the most enthusiastic advocates of the theory of orthogenetic evolution in the realm of biological evolution was Arthur Smith Woodward, a palaeontologist at the Natural History Museum in London. But Smith Woodward is best remembered as the dupe in the notorious Piltdown fraud of 1912: it was he who described these deliberately 'planted' remains as belonging to a distinct species of early humanity, *Eoanthropus dawsoni*. Most of the scientists who took Piltdown seriously were, in fact, advocates of evolutionary parallelism, and some of them linked this theory directly to the claim that the modern races are not closely connected. Arthur Keith, for instance, disputed Smith Woodward's reconstruction of 'Piltdown man' – but only because he wanted to extend the evolutionary parallelism in the human family tree even further back in time.[40]

The significance of Piltdown was that it seemed to confirm the existence of parallel branches within the human family tree, each line having its own pattern of development. Where the brutish Neanderthal type had once been treated as a step in the progression from ape to modern human, now the Neanderthals were dismissed as a separate branch of humanity which had been wiped out by our own ancestors invading Europe from central Asia. This whole episode in the history of palaeoanthropology can thus be interpreted as an extension of the cyclic model of evolution that had existed as an alternative to Darwinism thoughout the Victorian era.

For Sollas race conflict was an important feature of human evolution. Whatever the process that generated the new lines of evolution (certainly not Darwinian natural selection), it was essential that newly evolved types displaced their predecessors The implications of this theory for the imperialist view of race relations is obvious enough – Sollas welcomed the

[40] Keith has, in fact, been suggested as the chief architect of the Piltdown fraud in the latest of the many attempts to unravel the mystery, although I find the case against him less than convincing if only because it is not clear *why* Keith would have wanted to 'plant' an ape jaw along with human remains; see Frank Spencer, *Piltdown: A Scientific Forgery* (London: Natural History Museum / Oxford: Oxford University Press, 1990). For background to the Piltdown affair, including the theories of Sollas, Keith and Woodward, see Bowler, *Theories of Human Evolution* (note 22).

extermination of races which could not properly exploit the territory they occupied:

> What part is to be assigned to justice in the government of human affairs? So far as the facts are clear, they teach in no equivocal terms that there is no right which is not founded on might. Justice belongs to the strong, and has been meted out to each race according to its strength; each has received as much justice as it deserves. What perhaps is most impressive in each of the cases we have discussed is this, that the dispossession by a new-comer of a race already in occupation of the soil has marked an upward step in the intellectual progress of mankind. It is not priority of occupation, but the power to utilize, which establishes a claim to the land. Hence it is a duty which every race owes to itself, and to the human family as well, to cultivate by every possible means its own strength: directly it falls behind in the regard it pays to this duty, whether in art or science, in breeding or in organization for self-defence, it incurs a penalty which Natural Selection, the stern but beneficient tyrant of the organic world, will assuredly exact, and that speedily, to the full.[41]

In the same vein, Keith compared the extermination of the Neanderthals with what was happening to the natives of Australia and North America.[42] Over the next few decades he went on the develop a whole theory of human evolution based on tribal conflict.[43]

This appeal to the importance of racial conflict as the mechanism of progress certainly looks like a form of 'social Darwinism.' Note how Sollas openly invokes natural selection as the driving force of race relations. Yet in the same book he ridiculed the Darwinian mechanism of natural selection acting on individual variations.[44] The explanation of this paradox lies in the fact that Sollas and Keith wanted selection to act between races, but looked to some more purposeful mechanism in the actual production of new types. The ideology of race conflict was, in fact, an extension of the non-Darwinian model of evolution that had flourished as an alternative to linear progressionism throughout the Victorian era. The concept of the 'struggle for existence' could be exploited in a variety of ways, some of which had little to do with the original form of Darwinism. In the early twentieth century, the image of conflicting races, each with its own destiny and character, played an important role in the rhetoric of imperialism. It also backed up the call of the eugenics movement for steps to be taken to stave off racial degeneration by preventing the breeding of the

[41] See W. J. Sollas, *Ancient Hunters and their Modern Representatives* (London: Macmillan, 1911), p. 383.

[42] Arthur Keith, *The Antiquity of Man* (London: Williams and Norgate, 1915), p. 136.

[43] Keith's views on the positive role of race-conflict were later summed up in his *A New Theory of Human Evolution* (London: Watts, 1948).

[44] Sollas, *Ancient Hunters* (note 41), p. 405.

feebleminded.[45] Eugenics has been linked both to social Darwinism and to the rise of Mendelian genetics in the decades after 1900, but its emphasis on racial character links it also to an earlier, non-Darwinian view of history.

By extending our coverage of the 'Darwinian revolution' into later decades we can see that many of the conventional myths about the impact of the *Origin of Species* must be rejected. Darwin's theory was certainly greeted as an opportunity by those who wanted to push for social reform and an extension of the free-enterprise system. As part of Huxley's campaign to earn science its rightful place in the world, and as a component of Spencer's philosophy of gradual progress, Darwinism was taken up with enthusiasm by certain sections of the Victorian intellectual world. For this to happen, some of Darwin's most important scientific insights had to be pushed aside, to be revived only in the twentieth century.

Those who adopted a more conservative posture were not thereby debarred from accepting the general idea of evolution. Although some opted for creationism at first, there was a steady movement toward the formulation of non-Darwinian theories of development that would preserve and modernize certain aspects of an alternative view of history. For the exponents of orthogenesis and racial conflict, evolutionism also offered an opportunity rather than a threat – although to understand how this was possible we have had to explore the often neglected world of non-Darwinian evolutionism.

[45] The eugenics movement was founded by Darwin's cousin, Francis Galton, in the 1880s, but did not gain significant influence until the early decades of the twentieth century; see for instance Daniel Kevles, *In the Name of Eugenics: Genetics and the Uses of Human Heredity* (New York: Knopf, 1985). As Kevles' title indicates, the claim that an individual's character is determined by heredity gained a considerable boost from the emergence of genetics after the 'rediscovery' of Mendel's laws of heredity in 1900. My purpose here is to note that the movement also gained support from those who were more interested in the determination of character by *racial* inheritance – many of whom were not geneticists.