P. Bowler, 2009, Evolution: The history of an idea (U of California Press, Berkeley).

8 Evolution, Society, and Culture, 1875–1925

By 1875 the majority of educated people in Europe and America had accepted evolution. Even religious thinkers were now trying to come to terms with the prospect of a natural origin for humanity. Opponents of religion openly rejoiced at the prospect of replacing ancient superstition with a philosophy based on a scientific understanding of human nature. Across the spectrum of theological, philosophical, and political thought, the idea of evolution exerted a powerful effect on the imagination. This was an age where everything would be transformed by the idea that humanity was the product of a natural process that had operated long before we actually appeared on the earth. Themes of evolution, progress, and struggle permeated even the literature of the period, although most writers had only the vaguest understanding of the Darwinian theory (Beer 1983; Bender 1996; Carroll 1995; Henkin 1963; G. Levine 1988; Morton 1984).

This lack of any precise Darwinian focus should not surprise us. The late nineteenth century was the era of the eclipse of Darwinism, a time in which scientists questioned the adequacy of the Darwinian selection theory even more fiercely than in the 1860s. Since scientists were suspicious of the selection theory, it would be surprising if thinkers in other areas blindly accepted it. Our perception of this period is distorted by popular images of a rampant social Darwinism in which, it is alleged, all moral standards were abandoned. People were taught that only material success mattered. But if the most materialistic form of evolutionism was not accepted by the scientists, why should we assume that the whole age was mesmerized by the implications attributed to that theory by its opponents? In fact, the story of evolutionism's cultural impact is a good deal more complicated than implied by the simple model of a transition from natural theology to ruthless social Darwinism.

Our vision of the whole Darwinian revolution has been skewed by the fact that the evolutionary movement became known as Darwinism even though the theory of natural selection was not widely accepted. What we call Darwinism today—a reliance on natural selection as the sole mechanism of change—corresponds to the neo-Darwinism of late-nineteenth-century biology, which was highly controversial at the time. It is all too easy for a historian unfamiliar with the range of evolution theories then available to be misled into thinking that the Darwinism of the late nineteenth century is the Darwinism of today. Such a projection of the present onto the past misses the significance of the selection theory's long eclipse. The age of evolutionism may have been called an age of Darwinism, but the ideas discussed were Darwinian in only the loosest sense and would not be counted as such by modern standards.

Another source of misunderstanding is the ease with which anyone unfamiliar with the detailed theory of natural selection may confuse it with some of the alternatives. Darwin has been so closely associated with the idea of the struggle for existence that any theory evoking struggle is automatically assumed to be Darwinian. The possibility that competition might be seen as the spur to self-improvement in a Lamarckian theory is forgotten—and to be fair, some nineteenth-century thinkers were unclear about the distinction between selection and Lamarckism. Many who rejected individualistic natural selection accepted that there would be competition between the rival species produced by some other mechanism, and assumed that this was a form of Darwinism. Darwin did believe that species were driven to extinction by the appearance of better-adapted rivals, but those who invoked this mechanism of group selection may not have been Darwinians in the modern sense. The fact that Darwin became identified with any mechanism of change involving struggle is obviously important in the attempt to survey the interaction of science and society at the time. It tells us that a scientific theory is as likely as anything else to serve as the label for a set of cultural values. But to gain a properly nuanced understanding of the interaction, we must allow for the existence of non-Darwinian alternatives. When dealing with the eclipse of Darwinism, it is important not to use the label *Darwinian* too casually.

The dominant theme of late-nineteenth-century thought was progress, and evolutionism became popular because it was perceived as a scientific expression of this broader principle. But the concept of progress itself could exist in different, and to some extent contradictory, forms. Western culture was profoundly affected by the technological progress associated with industrialization, but there were various groups within society which reacted

to social change in different ways. Traditionalists wanted to turn the clock back to a hypothetical age of stability, while industrialists and entrepreneurs demanded political power consistent with their newly earned wealth. The latter were likely to endorse a philosophy of progress which made their demands seem no more than acceptance of the next step in an inevitable advance.

Other groups were less sure of the benefits of progress and less willing to endorse a philosophy in which economic success was the only measure of development. The appeal of evolutionism to scientific experts such as T. H. Huxley was that it offered the hope of heading off working-class discontent by promising slow but sure progress in the future—while leaving the experts to gain ever more control over modern society. As the industrial revolution gave way to the age of imperialism, new expressions of the idea of progress manifested themselves as white people sought means of justifying their domination of the "less advanced" branches of the human stock. And the possibility that progress was not uniform but included occasional episodes of degeneration also began to loom larger in the minds of those who faced the cultural fragmentation of the fin de siècle, the end of the century of progress. (On nineteenth-century thought, see Copleston 1963, 1966; Mandelbaum 1971; Willey 1949, 1956. On the idea of progress, see Bowler 1989a; Bury 1932; Pollard 1968; Van Doren 1967.)

The simplest model of progress is based on a "ladder": the advance is defined in terms of a linear hierarchy. This linear system played a major role in the life sciences and was linked strongly to the model of embryological development and the recapitulation theory. A parallel to this emerged among sociologists, anthropologists, and archaeologists who were convinced that history revealed stages of social development culminating in Western culture. Such a model presupposes that development moves in a certain direction, and there is little incentive to inquire about the mechanism generating the advance. The linear model is almost teleological in its willingness to depict the advance as preordained. Radical thinkers such as Herbert Spencer concealed the goal-directed nature of progress by implying that there was no fixed line of advance, only a more general tendency for things to become more complex. In practice, however, even Darwin and Spencer invoked a linear hierarchy of progress with reference to the human species. They still saw the universe as a system designed to produce—in the long run—states morally preferable to the earlier, more primitive states. By portraying progress as the outcome of natural law, however, they were able to formulate a system in which the advance might be irregular or might even be temporarily reversed.

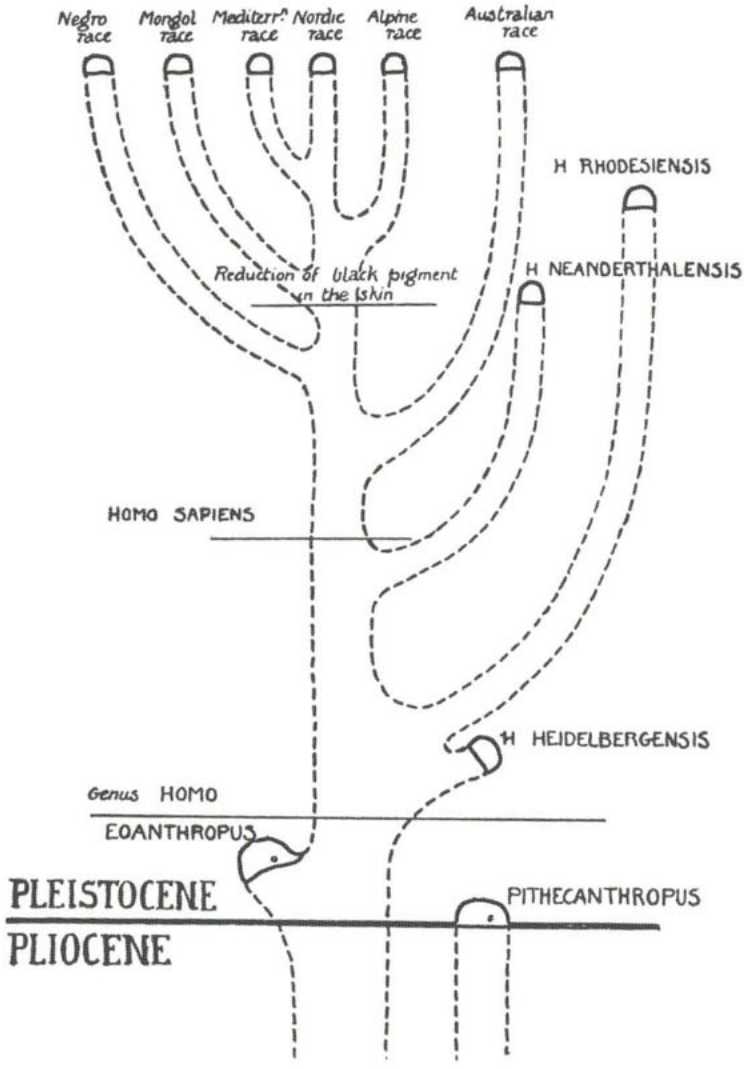
By the early twentieth century, the progressionist consensus which had dominated late-nineteenth-century thought was becoming fragmented. However complex the process of biological evolution, psychologists and anthropologists now began to doubt that the human mind and its achievements could be explained as consequences of a universal evolutionary process which had begun with the origin of life itself. A more relativistic view of the different human races and cultures emerged, one no longer based on the assumption that the Western pattern was superior. Some now doubted the idea of progress altogether, especially when the Great War revealed the depths to which supposedly civilized peoples could descend. The legacy of evolutionism continued to play a role, however, even if turned on its head. The analytical psychology of Sigmund Freud still rested on the assumption that the human mind has advanced through animal stages of development—only now those stages lurked within the subconscious, evading all the efforts of the rational mind to control them.

This chapter surveys the impact of evolutionism in three broad areas. First comes the subject of human origins: what does biology tell us about our ancestry, and how can the idea of evolution be used to help us understand the development of the mind, of society, and of culture? Here the study of hominid fossils interacted with prehistoric archaeology and anthropology. While anthropologists looked for remnants of the earliest forms of human society, evolutionary psychologists tried to define the hierarchy by which new mental functions were added in the rise from animal to human. These issues lead naturally into the second broad area: the impact of evolutionism on social thought. If social Darwinism is a problematic concept, we must explore the rival ways in which models of social evolution were used to defend new ideologies. Race became an important biological concept, with evolutionism being called in to justify existing prejudices about the hierarchy of human types. By the early twentieth century, the claim that human nature is rigidly fixed by heredity was becoming an important part of social policy as the eugenics movement called for limits on the breeding of the "unfit." Finally, we look at the influence of evolutionism on philosophy and religion. The debates of the 1860s on the theological implications of evolution died down in the later part of the century because so many modes of thought took it for granted that the world was the product of a progressive and purposeful development. But the gulf separating the traditional and the modern viewpoints was to some extent papered over rather than confronted, and the emergence of a fundamentalist opposition to evolution in the 1920s symbolized the underlying tensions.

THE MISSING LINK

The question of human origins was hotly debated in the 1860s even though Darwin had excluded it from the *Origin*. The implications of an apelike ancestry for the human race were immense, but the whole project depended on convincing everyone that the evolutionary link was real. Huxley made the case for humanity's close relationship to the apes but had been forced to concede that there was no good fossil evidence for the missing link. When he accepted that the famous Neanderthal remains were fully human, despite their superficially apelike character, he abandoned the hope of using them as the link between modern humans and their hypothetical ancestors. More of the Neanderthal-like specimens subsequently were discovered, and some authorities began to challenge Huxley's position, arguing that the Neanderthal race or species was indeed a key step in the ascent from ape to modern human. In the 1890s the discovery of "Java man," or *Pithecanthropus*, began a new era of intensive research. By the early decades of the twentieth century, several important new discoveries had been made, although one of the most important subsequently turned out to be a hoax (the now notorious Piltdown remains). Paleoanthropology—the study of fossil hominids—only now became a recognizably distinct area of science. In one respect, these discoveries provided belated confirmation of the evolutionists' case by revealing creatures which could not be classified as either truly ape or human. But far from providing a clear picture of human origins, they served only to confuse the issue. There were several different forms of early hominid, none of which corresponded exactly to what the evolutionists had expected. They had to accept that the evolution of the human race was a complex process, as indeed were most of the major steps in evolution (see fig. 30). Instead of ascending a simple ladder defined by increasing brain size, nature seemed to have experimented with several forms of humanity and driven all but one to extinction (Bowler 1986; Lewin 1987; Reader 1981).

The discovery of additional Neanderthal-like remains, especially at Spy in Belgium in 1886, confirmed that this was a genuinely ancient human race or species. The Neanderthals were heavily built and had skulls with an apelike brow ridge, although as Huxley had pointed out, their cranial capacity was equal to that of a modern human. They used fire and tools, and the Mousterian industry of stone toolmaking was now identified as theirs. Some authorities began to suggest that they were indeed an intermediate stage in the evolution of modern humanity from the apes. Physical anthropologists anxious to stress the allegedly primitive character of the living



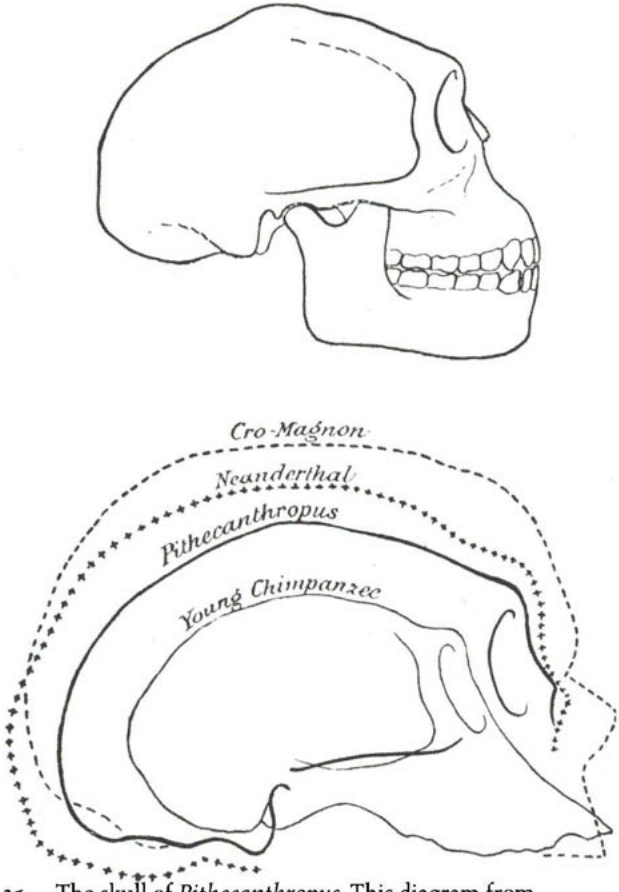
30. Elliot Smith's tree of human evolution. This tree of evolution from Grafton Elliot Smith's *Evolution of Man* (1924: 2) shows a typical early-twentieth-century view of human origins. Note that the Nordic race forms the endpoint of the main trunk, while the other races have diverged away from the main line at different points in its development. The Neanderthals have branched much earlier than any of the living races and are now extinct (*Homo heidelbergensis* was thought to be an even earlier branch). On this diagram, *Pithecanthropus* is so far removed from the main line that it appears only as the endpoint of a parallel branch at the bottom right. Piltdown man *(Eoanthropus)*, however, is very close to the main stem.

black races of Africa and Australia sometimes depicted them as little more than slightly improved Neanderthals.

The idea that there was a Neanderthal phase in human evolution remained in play (e.g., Brace 1964), although it has been undermined by modern genetic evidence. This evidence supports a rival hypothesis which emerged following the discovery of another Neanderthal skeleton in 1908. The paleontologist who described it, Marcellin Boule (translation 1923), went out of his way to exaggerate the apelike character of the specimen, ignoring evidence that its bent posture was the result of arthritis. For Boule and his followers, the Neanderthals were so primitive that they could never have had time to evolve into modern humans. They were a degenerate or primitive side branch of the human family tree which had survived in isolation in Europe before disappearing as modern humans invaded from elsewhere (Hammond 1982).

In the preceding decade, much attention had focused on a new and much more primitive hominid fossil unearthed in Java in 1891–1892. Its discoverer was a Dutch scientist, Eugene Dubois, who had been inspired by Haeckel's prediction that the closest link between humans and apes was the orangutan rather than the African ape (Theunissen 1989). His discovery revealed a creature with a thighbone suggesting a completely upright posture, but with a brain capacity only halfway between that of an ape and a modern human. To Dubois, this was the real missing link, and he borrowed Haeckel's term to name it *Pithecanthropus erectus.* Haeckel welcomed the discovery (translation 1898), as did his disciple Gustav Schwalbe, and they depicted a linear sequence of development from the ape to *Pithecanthropus* and the Neanderthals to modern humans. (See fig. 31.) But most paleoanthropologists remained doubtful, finding the combination of a primitive skull and fully upright posture unconvincing.

Darwin had suggested that our ancestors stood upright before their brains grew bigger, but his hypothesis went unnoticed in an age convinced that intellectual progress was the driving force of evolution. The British cerebral anatomist Grafton Elliot Smith (1924) was particularly influential in promoting the theory that the expansion of the brain had come first, with the upright posture being acquired only after our ancestors had become intelligent enough to see the advantages of moving out of the trees onto the open plains. On this model, Dubois's Java man simply did not fit in and had to be dismissed as a less successful side branch of the human family tree. This in turn encouraged the rejection of the Neanderthals as human ancestors. Already the pattern of human origins was looking more complex than a simple ladder. The new theory treated human evolution more like a tree



31. The skull of *Pithecanthropus*. This diagram from Haeckel's *The Last Link* (1898: 25) shows a restoration of the skull of *Pithecanthropus* (top). Beneath is a comparison of the skulls of a Cro-Magnon (almost modern human), a Neanderthal, *Pithecanthropus,* and a young chimpanzee. In direct contradiction to the branching model provided by fig. 30, this model gives the impression of a steady expansion of skull size indicating a continuous evolutionary development. Note, however, the large lower rear section of the Neanderthal skull, which provides it with a cranial capacity as large as that of the Cro-Magnon skull.

but still assumed that all branches stemmed from the same tendency to improvement, with varying degrees of success.

It is sometimes argued that this episode was inspired by a virtual rejection of evolution, because none of the known fossils were admitted as the direct ancestor of modern humanity (Brace 1964). But this suggestion ignores the fact that early-twentieth-century phylogenetic research had revealed the complexity of the whole evolutionary process. It was widely accepted that, because of parallel evolution, it was difficult to reconstruct the exact origins of any modern form. Landau (1990) stresses that all the theories seeking to explain human origins use the same elements (bipedalism, brain enlargement, emergence from the trees) combined in different ways. She argues that the theories all have a narrative structure and thus resemble folktales or creation myths, a suggestion which horrified modern paleoanthropologists who thought that it implied that they too were still only "telling stories." In fact, all explanations of particular events in phylogeny which invoke adaptation have a narrative structure (often called an adaptive scenario), so Landau's suggestion is not as threatening as it sounds. More problematic is her tendency to ignore the role of progressionist ideas in these early theories, thus exaggerating their similarity to modern explanations conceived within a Darwinian framework.

The fascination of the "brain first" theory of human evolution explains several subsequent events in the history of paleoanthropology. It accounts for the ease with which one of the most notorious frauds in the history of science was accepted by the scientific community. This was a group of remains discovered by an amateur archaeologist, Charles Dawson, at Piltdown in the south of England in 1912. There were fragments of a skull, fairly thick but otherwise relatively modern looking, and a jaw that was apelike apart from the pattern of wear on the teeth. Arthur Smith Woodward of the Natural History Museum in London described the remains as those of a new species, *Eoanthropus dawsoni*, Dawson's dawn man. For a while, most authorities took the remains to be genuine because they fitted in so well with the hypothetical line of human evolution then in favor. The fact that the cranium was large but the jaw still apelike fitted Elliot Smith's brain-first theory, while the existence of a non-Neanderthal line of human evolution confirmed the prediction that the Neanderthals themselves were on a side branch of the human family tree.

Arthur Keith, an anatomist who had come out in support of the theory of Neanderthal extinction, was a leading advocate of the significance of Piltdown man (Keith 1915). Keith also argued that, if the main line of human evolution was paralleled for vast periods of time by other side

branches, then it was reasonable to suppose that the racial types within modern humanity were also of great antiquity. If the "lower" races could no longer be dismissed as surviving Neanderthals, they could at least be branded as ancient types with no close relationship to the whites, who had advanced farther up the scale of mental development. Keith had little doubt about what happened whenever higher and lower forms came into contact: "What happened at the end of the Mousterian period we can only guess, but those who observe the fate of the aboriginal races of America and Australia will have no difficulty in accounting for the disappearance of *Homo neanderthalensis.* A more virile form extinguished him" (1915: 144). Significantly, Keith went on to champion racial conflict as a major factor in human progress (1949).

The Piltdown remains were too convenient for the paleoanthropologists of this period to ignore. As more discoveries were made, the Piltdown remains gradually came to be seen as anomalous, but not until 1953 were they exposed as a fraud (J. S. Weiner 1955). An ancient human skull had been planted alongside an ape jaw, which had been stained to make it look ancient and filed to produce a human pattern of wear on the teeth. Dawson was probably one of the culprits, but a minor literary industry has grown up around the effort to identify the scientific brains behind the scheme (Blinderman 1986; Millar 1972; F. Spencer 1990). Even Elliot Smith and Keith have been implicated, somewhat implausibly considering the amount of time they both wasted on describing the remains. The most likely candidate is Martin Hinton, a jealous subordinate of Smith Woodward's, who may have intended to embarrass his boss by revealing the hoax but realized too late that the whole thing had got out of hand. Few of the detective-style efforts to uncover the culprit acknowledge the theoretical preconceptions that made the Piltdown combination seem so plausible when it was first reported.

One of the discoveries that made Piltdown seem anomalous even before the fraud was exposed was a report by Davidson Black of more *Pithecanthropus*-like remains in China in the late 1920s. "Pekin man" (as it was popularly known) was reported as a new species but is now regarded as belonging to the same species as *Pithecanthropus,* renamed *Homo erectus.* Few at first accepted what has become the modern view, that *Homo erectus* was probably ancestral to *Homo sapiens.* Instead, the discovery seemed to confirm a long-standing belief that Asia was the cradle of humankind, not Africa as Darwin had supposed. Black had in fact gone to China in the hope of proving that the harsh climate of central Asia had stimulated the advance of humans from their ape ancestors, not the lush tropical environment of

Africa. His fossil discoveries disappeared in the chaos surrounding the Japanese invasion of China preceding World War II, and only plaster casts now remain.

The popularity of the Asian theory of human origins helps to explain the initially negative reaction to what was subsequently accepted as a far more significant find. Raymond Dart discovered a juvenile hominid skull at Taungs, South Africa, in 1924, which he named *Australopithecus africanus.* Dart saw evidence from the skull that this creature had walked fully upright, yet the brain was scarcely larger than an ape's. His claim that it was the true ancestor of humankind was rejected because all eyes were focused on Asia, and no one expected the line of human ancestry to have achieved bipedalism so early. In fact, Dart had confirmed Darwin's hypothesis that the key breakthrough defining the human family was the acquisition of an upright posture, with the enlargement of the brain coming later. But at the time, no one was prepared to admit the possibility that an adaptive transformation could have played so vital a role, because everyone was obsessed with the belief that the drive to gain greater intelligence was the motivating force. Dart's views were treated with skepticism until further discoveries of australopithecines by Robert Broom in the late 1930s confirmed that this early hominid type was indeed bipedal. The australopithecines' significance as the founders of the human family was not admitted until the 1950s, when the modern Darwinian synthesis highlighted the crucial role of adaptation and exposed the hidden teleology of the assumption that an increase in brain size was the central driving force of evolution.

THE ORIGINS OF CULTURE AND SOCIETY

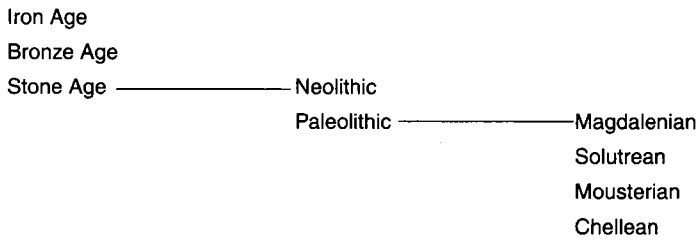
The late nineteenth century's vision of progress was based on the model of a ladder of developmental stages. This model was based not on a study of fossils—because there were hardly any available—but on indirect arguments provided by archaeology and anthropology. The 1860s had seen a revolution in ideas about the antiquity of the human species which paralleled, but was to some extent independent of, the Darwinian revolution in biology. While Huxley lamented the missing link in the fossil record of humanity, geologists and archaeologists uncovered stone tools dating back to the ice ages, confirming that humans had been on the earth for a vast period of time. These tools suggested a primitive level of technology widely assumed to imply a primitive level of culture. Perhaps the early humans who made the tools had had a level of mental ability inferior to that evolved by

modern humans. Anthropologists looking at "savage" cultures in Africa and Australia saw their level of technology as parallel with that of Stone Age cultures, and thus used these peoples as models for the early stages of human evolution. Since the explorers of the Victorian era routinely pictured the peoples they encountered as mentally and morally less advanced than themselves, an image of humanity evolving from a level of savagery equivalent to that of the most despised living peoples was established. The resulting developmental model of mental and cultural evolution postulated a linear hierarchy of stages leading up to the level of modern Europeans. The parallel between this model and the linear sequence of evolutionary stages from the apes to the Neanderthals to modern humans was obvious to many prehistorians, although some doubted that the racial diversity of modern humanity could be fitted into so neat a sequence.

Archaeology and Anthropology

A key element in the emergence of the developmental form of evolutionism was the study of prehistory (Bowler 1989a; Daniel 1975; Grayson 1983; Trigger 1989; Van Riper 1993). Archaeologists such as John Lubbock (1865) distinguished between the Old and the New Stone Ages and saw these as stages in the development of technology preceding the discovery of bronze and then iron. By the 1870s it had become possible to recognize a number of different toolmaking cultures in the Paleolithic (the Old Stone Age), and most archaeologists assumed that these could be ranked in an evolutionary hierarchy of increasing sophistication. The French archaeologist Gabriel de Mortillet proposed four levels of Paleolithic culture, each named after a characteristic site. Thus, the overall sequence of technological progress was as shown in fig. 32.

The number of Paleolithic cultures was subsequently expanded even further (de Mortillet 1883). Although some archaeologists thought that the same cultures sometimes coexisted at a single period in time, de Mortillet was convinced that they formed a universally valid evolutionary sequence. As a prominent socialist, he saw this model of linear progress as a symbol of the inevitability of further social progress in the modern world (Hammond 1980). Since the Mousterian culture seemed to be linked to the Neanderthal race or species, de Mortillet was eager to link the cultural progress he saw in the archaeological record with the sequence of evolutionary stages being proposed by some biologists to cover the emergence of modern humans from the apes. Thus, the makers of the most primitive stone tools were pictured as primitive ape-men, allowing both the Neanderthals and those mod-



32. De Mortillet's chronological sequence of cultures in the archaeological record.

ern peoples who still used stone tools to be dismissed as mentally inferior to the white race.

Lubbock played an important role in linking the emerging discipline of anthropology to this evolutionary synthesis (1870). He described the more "savage" modern tribes in the harshest terms, depicting them as both congenitally stupid and immoral, and assumed that their behavior was characteristic of the primitive humans of the Old Stone Age. The leading British anthropologist, Edward B. Tylor, arranged all living cultures into a single developmental hierarchy, with Europeans at the top (Burrow 1966; Kuper 1988; Stocking 1968, 1987). He, too, assumed that the sequence corresponded to a historical development—his *Researches into the Early History of Mankind* (1865) was a study of living, not ancient, cultures. Modern savages became, in effect, living fossils left behind by the march of progress, relics of the Paleolithic still lingering on into the present. Tylor envisioned only one Culture, with different levels of development and a clear goal toward which it was progressing. The only problem was to explain why some peoples lagged behind others in the ascent. This apparent teleology was no relic of the old theological viewpoint: Tylor went out of his way to describe religion as a product of the primitive level of mental development which had to be exposed so that it could be eliminated from modern life. But the radicals' faith in progress was so secure that they built their own values into evolution by assuming that their goals were also those of nature. Tylor's disciple J. G. Frazer achieved international popularity at the end of the century with his *Golden Bough* (new edition 1924), a depiction of classical Greek and Roman beliefs as stages in the development of religion from primitive times to the modern world. It was assumed that rational analysis would reveal how our ancestors had been misled into believing in the supernatural.

The American Lewis Henry Morgan arrived at a similar system of cultural evolutionism from a study of languages and kinship systems (Kuper

1985; Trautmann 1987). Morgan's *Ancient Society* (1877) proposed stages of development from savagery to barbarism to civilization. He was more aware of the role played by material factors in defining the level to which a particular people could rise, but the sequence of stages he defined was, like Tylor's, predetermined by the inherent logic of how the human mind seeks to understand its environment. Morgan followed Lubbock's lead in accepting that the humans who still lived in a state of savagery remained intellectually inferior to Europeans, relics of the past mentally as well as culturally. The evolutionary scheme remained in use throughout the rest of the century by American anthropologists, such as Daniel Brinton, who were charged with studying the indigenous peoples of the West. Significantly, these studies were carried out mostly by geologists and biologists who saw the evolutionary scheme as integral to the natural sciences.

The decision to treat savage peoples as though they were mentally and morally inferior to Europeans was also inspired by the evolutionism of Herbert Spencer (Duncan 1911; J. Greene 1959b; Kennedy 1978; Peel 1971). Spencer's philosophy was widely admired from the 1860s onward, and although it was eclipsed in Europe by the end of the century, it remained influential in America. His was a vision of progress driven by universal law, in which successive phases of equilibrium were achieved as the whole moved from a state of homogeneity to heterogeneity—that is, from simple to complex. Spencer invoked both natural selection and the inheritance of acquired characters to explain biological, mental, and social evolution, but his main concern at the social level was to understand the history of the human race in progressionist terms.

Although in principle Spencer's philosophy promoted the vision of evolution as a branching tree rather than as a ladder, he saw a main line in social progress leading toward modern industrial civilization. Peoples who had not achieved a modern form of civilization by themselves were being left behind because a more complex culture stimulated mental improvement, just as greater mental powers made it possible to advance to higher levels of culture. Sociology thus concurred with anthropology in recognizing an evolutionary hierarchy of social and cultural levels. Both used biology to explain why races which advanced to higher levels of social organization did so by increasing their mental powers. Liberal thinkers who insisted that all humans had the same level of mentality, whatever their culture, were now on the defensive against the prevailing image of a racial hierarchy created by the combination of biological and cultural evolutionism.

The linear progressionism of this social evolutionism was related more to a developmental, Lamarckian view of biology than to Darwinism. The linear

model broke down among paleoanthropologists in the early twentieth century, as noted above, yet the scientists who founded this discipline remained wedded to a more complex model of racial origins which still allowed biology to be seen as a determinant of human character. In anthropology and the social sciences, there was a far more decisive break with the old evolutionism. In order to free themselves from the yoke of evolutionary biology, the anthropologists and sociologists repudiated the evolutionary paradigm altogether. They rejected the assumption that biological evolution had anything to say about how human societies and cultures developed, and in so doing freed themselves from the shackles of the linear model in which modern Western values were seen as the natural goal of evolution. Evolution might have shaped the human mind, but in so doing it had created something capable of transcending all the dictates of its biological origin (Cravens 1978; Greenwood 1984; Harris 1968; Hatch 1973; Ingold 1987).

In Europe, scholars such as Max Weber and Émile Durkheim began to treat each society or culture as a functioning whole which cannot be evaluated by the standards of any other. The assumption that the rational structure of the mind drives cultural change in a fixed direction was rejected, and along with it went the need to rank all societies into a linear hierarchy with Europeans at the top. The British psychologist W. H. R. Rivers returned from an expedition to the Torres Straits, between Australia and New Guinea, convinced that the cultures he had encountered there were so diverse that they could not be arranged along a linear scale. Rivers at least remained interested in the history of cultures, but saw each as having its own course of development unrelated to any other. Later British anthropologists such as the Polish émigré Bronislaw Malinowski adopted a functionalist approach similar to that of the Continental sociologists, who rejected history as irrelevant to the understanding of how each society actually works to satisfy human psychological needs (Kuklick 1991; Kuper 1972; Stocking 1996).

In America, Franz Boas and his students introduced a system of cultural relativism which, like Rivers's, allowed each culture to be seen as a product of its own unique history and repudiated the attempt to measure other cultures by Western values (Cravens 1978: chap. 3). Since they no longer saw cultures as forming a hierarchy with the West at the top, they could reject the racism of the evolutionists who had labeled cultures as "inferior" and perceived the people engaged in them as being endowed with lesser mental abilities. Cultural factors alone accounted for the differences, and as A. L. Kroeber (1917) proclaimed in a paper on the "superorganic," those factors could not be reduced to biology and had nothing to do with the biological origins of the human mind. When Boas's student Margaret Mead returned

from Samoa to proclaim that the "adolescent trauma" which plagued Western teenagers was unknown in the sexually relaxed atmosphere of the South Seas, her message that biology placed no restrictions on behavior was popularized throughout the English-speaking world (for a critique of her work, see Freeman 1983). Boas was convinced that he and his followers had thrown off the shackles of Darwinism, little realizing that the linear paradigm of the cultural evolutionists had owed little to Darwin's theory in biology.

Psychology

The evolutionary model of culture and society was intimately connected with a developmental account of how the faculties of the mind had been produced (R. Richards 1987). In the early nineteenth century, many liberal thinkers had retained the classic notion of the mind as a tabula rasa, or blank slate, whose structure—that is, the individual personality—was constructed through interaction with the natural and social environment. Opposed to this was the view that the faculties of the mind were innate, and to some extent this had been reinforced by materialist principles arising from phrenology. If the mind was a product of the physical operations of the brain, then any preexisting structure in the brain must predetermine the faculties of the mind (Young 1970a). The scientific naturalists of the 1860s were committed to the view that the mind was governed by natural law, Huxley in particular seeing the mental world as a powerless epiphenomenon generated by the brain.

Such a position would be reinforced by showing that behavior was governed by inherited instincts as well as learned habits. Darwin himself accepted an important role for instinct and believed that instincts could be altered by natural selection. But he also accepted another possibility which was central to the philosophy of Herbert Spencer, the belief that learned habits could be turned into inherited instincts by the Lamarckian process of the inheritance of acquired characteristics. These evolutionary processes offered an explanation of how the faculties of the human mind have been created by evolution. New levels of activity and new instincts were created by our ancestors' interaction with their environment, including the increasingly complex social environment.

Darwin hinted at a darker side of human evolution in his *Expression of the Emotions in Man and the Animals* (1872), which sought to explain much of our emotional behavior in terms of instincts inherited from our animal ancestors. But there was no follow-up to this initiative because most evolutionists were anxious to distance themselves from the idea that we still

carry with us the legacy of our ancestry among the brutes. The emphasis was on how the higher faculties were created, especially the intellectual and social faculties, which were, in Darwin's view, the foundation of our moral values. It was assumed that, as the mind became more complex, its reasoning powers would increase and gradually gain a greater influence over behavior. Modern humans had acquired rational powers great enough to allow science to emerge. Only in the area of social behavior were instincts created by evolution still active in determining our lives.

Evolutionary psychology rested on an attempt to draw up a phylogeny of the mind, a reconstruction of the steps by which the ladder of mental ability had been ascended through the animal kingdom up to the modern human level. Like many of his contemporaries, Darwin had accepted anecdotal evidence suggesting that the rudiments of most of the higher mental faculties could be seen at work in animals. This anthropomorphic view of animal behavior made it easier to argue that the human mind was only an extension of the animal mind, not a totally new spiritual faculty as religious opponents claimed. Darwin's leading disciple in this area was G. J. Romanes, who expounded a developmental model of mental evolution in which social activity promoted the emergence of language and hence the development of higher mental faculties (Romanes 1888; on Darwin and Romanes, see Schwartz 1995). This was a linear model of mental development which made considerable use of the recapitulation theory. Romanes and his contemporaries identified the stages in mental evolution though the animal kingdom with the steps visible in the mental development of a human child. They often assumed that modern "primitives" still exhibit a childlike way of thinking (Gould 1977b: chap. 5; Morss 1990). One of the last developments in evolutionary psychology was an attempt by William McDougall and others to investigate the extent to which human social behavior was conditioned by instinct.

This developmental approach to psychology began to break down in the last years of the nineteenth century. Although initially inspired by evolutionism, Conwy Lloyd Morgan proposed his famous "canon" which required the psychologist to attribute to animals only the minimum level of mental ability required to perform their observed behavior. Morgan rejected much of the anecdotal evidence for the high level of animals' mental powers. He observed that when his dog was asked to bring a stick through a narrow gap in a fence, it was unable to solve the problem rationally—it simply kept running at the fence until by accident it lined the stick up parallel to the gap and got through. It could learn from this experience, but it could not think the problem out in advance the way a human could. Morgan's

canon (commonly known as Lloyd Morgan's canon) undermined the evolutionists' attempt to project the higher mental functions back down the scale of animal organization. In particular it reinforced the claim that animals do not have true language (Radick 2000). This buttressed the objections of those traditionalists who maintained that there was something unique about the human mind. Its reasoning powers, its language abilities, and its ability to recognize moral values were all features which raised it above anything observable in the animal kingdom. In Britain there was a revival of interest in the old-fashioned kind of psychology which treated the mind as a free agent capable of transcending natural law. Morgan himself went on to propose his theory of "emergent evolution" (1923), in which mind and spirit were new categories somehow added to the material world at certain stages in the advance of life.

In Germany, however, psychology was being established as a laboratory-based discipline which studied behavior without concerning itself with the evolutionary origin of mental functions. This new approach came to the English-speaking world in the form of behaviorism, which swept through American psychology in the early decades of the twentieth century. Under the leadership of J. B. Watson, behaviorism helped to establish psychology as an independent academic discipline, just as Boas's rejection of the evolutionary model helped to create modern anthropology (Cravens 1978: chap. 2). And, like the anthropologists, the behaviorists rejected all claims that the animal or the human mind was constrained by instincts generated in the course of evolution. Once again, the mind became a pure learning machine, a blank slate upon which experience (or the experimenter) could impose any form of behavior. For Watson it was illegitimate even to talk of the mind, since all that can be observed is behavior.

Academic psychology thus emancipated itself from the evolutionary paradigm. But outside the universities, the legacy of the developmental approach to the mind was anything but dead—although one of its major products would have horrified the previous generation. In France, the educational psychologist Jean Piaget continued to treat the mind of the growing child in terms of the recapitulation theory, stressing that the learning process must be adapted to the stage of mental development the child has reached at the time (Messerly 1996). Far more pervasive was the influence of Sigmund Freud's analytical school of psychology, which sought to treat mental dysfunctions by postulating an unconscious level to the mind. For Freud and his followers, the conscious mind often has difficulties controlling the biological (mostly sexual) desires programmed into the unconscious. Freud's theories had their roots in many areas of nineteenth-century

thought about the mind, but a number of historians have noted the role of developmental evolutionism (Morss 1990; Ritvo 1990; Sulloway 1979b). His image of the unconscious was of a deep reservoir of animal instincts overlaid with a superficial layer of rationality. The animal past was still buried within us, but far from transcending it as we mature, our conscious mind has to struggle to contain its influence within socially acceptable bounds. For both Freud and Piaget, it was not so much Darwinism as the recapitulationist-developmental model of evolution which was crucial, and both continued to believe that the Lamarckian theory must be true in order to explain how new levels of behavior are added in the course of evolution. Given the immense impact of Freud on twentieth-century thought—he himself compared his revolution to that of Darwin—this link to nineteenth-century evolutionism is of great significance. But the optimistic progressionists of Darwin's era would have shuddered to see their model of increasing rationality undermined by this revelation of the power of the animal urges still buried within our minds.

EVOLUTION AND RACE

The nineteenth-century anthropologists who created the linear hierarchy of cultural evolution were exploiting a model which owed little to Darwin's theory of natural selection. Nor indeed did this model necessarily commit them to the belief that humans had evolved from apes, although the assumption that humanity had risen from a primitive state certainly resonated with the theory of biological evolution. The idea of progress was central to the anthropologists' vision, as it was to many nineteenth-century philosophies, and the assumption that social and cultural progress were inevitable would form the basis for many attempts to see a parallel between biological and social evolution. The theory of evolution thus influenced social thought in many different ways. One obvious extension of the belief that humans have evolved from apes was to map the anthropologists' cultural hierarchy onto a parallel hierarchy of mental evolution. Those races which had not developed a sophisticated culture and technology were branded as evolutionary failures, living fossils with primitive mental powers who survived only because they were isolated from competition with more advanced races. Evolution also challenged those who insisted that the races were distinct biological entities, perhaps even separate species: how had the human family tree become divided into these different branches?

Europeans were aware of the physical differences between themselves

and other peoples, and as they began to exert control over other regions, they were increasingly self-conscious about those differences. There was a tendency to view other peoples as distinct racial types with their own physical and mental characters. As Europeans began to conquer, enslave, and even exterminate other races, there was a tendency to exaggerate these racial differences to justify the exploitation. If the nonwhite races were less than fully human, it was easier for whites to feel comfortable with a situation in which the superior race determined the fate of the inferior. Even within Europe, there was a sense that the various nations had different racial origins, and archaeology encouraged the feeling that whether a nation was descended from Celts or from Teutons (Anglo-Saxons) was a crucial part of its identity. The old Enlightenment ideal of a single, unified human nature, in which everyone started with the same mental and moral equipment, was coming under threat.

Writing originally in 1850, the anatomist Robert Knox proclaimed, "With me[,] race, or hereditary descent, is everything; it stamps the man" (1862: 6). Knox regarded Africans as a totally alien people, but his condemnation was not confined to the non-Europeans. This is how he characterized the Celtic race: "furious fanaticism, a love of war and disorder, a hatred for order and patient industry; no accumulative habits, restless, treacherous, uncertain: look at Ireland" (25). Knox's sense of the inferiority of many racial groups was taken up by anthropological societies founded in London and Paris during the 1860s. Although seen at first as an extremist position, this kind of thinking began to make serious headway as Western countries became more self-consciously imperialist toward the end of the nineteenth century (Banton 1987; Barker 1998; Bolt 1971; Frederickson 1971; Gould 1981; J. Haller 1975; Lorimer 1988, 1997; Snyder 1962; Stepan 1982).

Evolutionism helped to justify the belief that the nonwhite races were inferior by offering a new explanation of how the hierarchy of races had formed. Even before evolutionism became popular, the blacks of Africa and Australia had been portrayed as more apelike in their physical appearance than the whites. The intolerances of the age of imperialism encouraged the belief that these races had lower levels of intelligence and a weaker moral sense. The hierarchy of cultural stages erected by anthropologists such as Tylor and Louis Henry Morgan was increasingly identified with a hierarchy of mental development produced by biological evolution.

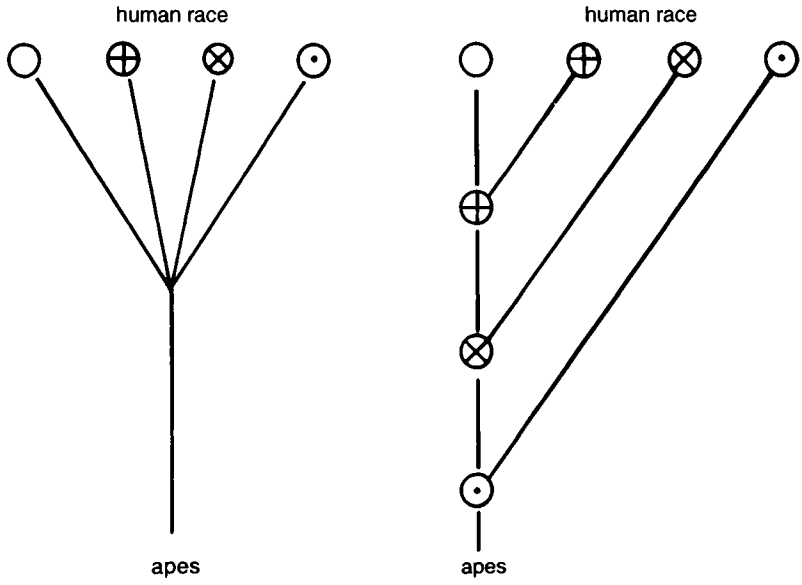
Not all anthropologists moved in this direction. Tylor himself began from the assumption that all humans have the same mental capacity. But later even he came to doubt this, and those more open to racist assumptions took it for granted that peoples with inferior levels of culture were stuck at

that level because they were more primitive mentally. For evolutionists such as John Lubbock and Herbert Spencer, it was obvious that the nonwhite races were equivalent to the Stone Age ancestors of the whites, preserving an apelike appearance and a lower level of mental and moral powers.

The cultural hierarchy had been erected without reference to Darwinism, and the non-Darwinian ideas of evolution which flourished in the late nineteenth century played a major role in sustaining the racial hierarchy. The neo-Lamarckian model of evolution as the addition of stages paralleled by the development of the embryo was especially powerful in this respect (Gould 1977b: chap. 5). Because ontogeny and phylogeny were supposed to be equivalent, the supposedly inferior mental capacities of the savage could be equated with those of a white child (Muschinske 1977). American neo-Lamarckians such as E. D. Cope (1887) listed the features that were supposed to indicate the blacks' "retardation of growth" (J. Haller 1975). Ernst Haeckel expressed similar views in Germany, and his philosophy has been identified controversially as a key influence on the later development of fascism and Nazism (Gasman 1971, 1998). The Italian criminal anthropologist Cesare Lombroso identified the "criminal type" within the white race as a throwback to an earlier stage of evolution (Nye 1976).

The developmental model of evolution was thus a powerful addition to the arsenal of those seeking to attack the character of other races. As late as the 1920s, the Lamarckian embryologist E. W. MacBride dismissed the Irish Celts as a lower race which should be eliminated from the British population (1924; Bowler 1984). To explain why some races had advanced farther up the scale than others, it was assumed that they had been exposed to a more stimulating environment. The whites, who evolved in the harsher climate of the north, were more advanced than the blacks of tropical Africa. For MacBride, the Anglo-Saxons were more advanced that the Celts because the latter originally had evolved in a softer Mediterranean environment. All these developmental models tended to ignore the element of divergence characteristic of Darwinism (see fig. 33).

The hierarchical scale of mental development could be imposed on a more complex model of racial origins in which multiple branches evolved in parallel. Traditionally, the whole human race was supposed to have descended from Adam and Eve, according to the hypothesis of "monogenism." But some scholars had long challenged this hypothesis on the grounds that the few thousand years of history accounted for in Genesis was not enough to allow the differentiation of a single human species into such diverse racial types. The alternative was "polygenism," the claim that the various races were separate creations, with only the whites having descended from Adam



33. Darwinian and developmental views of race. The left-hand diagram shows how the various human races might be related on a Darwinian model of branching evolution. They share a common ancestor but are divergent branches which cannot be ranked into a hierarchy. In the developmental model (right), which is consistent with the Lamarckian and recapitulationist theories, the living races form a hierarchy because the "lower" races have simply preserved earlier stages in the development of the highest. The assumption is that the side branches have not changed since they split off from the main line, perhaps because they were no longer stimulated by a challenging environment. The lower races are equivalent to the links missing in the fossil record.

and Eve. This view was congenial to Knox and the racial anthropologists of the mid–nineteenth century. There were even efforts, contrary to all experience, to claim that whites and blacks could not interbreed successfully. The Swiss-American naturalist Louis Agassiz found it difficult to accept that the blacks he encountered in America were of the same species as himself—and his support for polygenism was seen by Southern slave owners as a useful endorsement of white superiority. On this view, the blacks were primitive in a more fundamental sense—they were a separate species whose very essence was fixed at a lower point on the chain of being (Priest 1843).

The archaeological revolution of the 1860s opened up the vast timescale of human prehistory and provided enough time for significant racial differentiation to have occurred. But evolutionism also affected thinking on this issue. Darwin was not immune to the growing conviction that whites were

more highly developed than the other races, but he realized that all were still members of the same species precisely because they were interfertile. Some subbranches of the human family tree had developed further beyond the ancestral ape than others, but all shared a comparatively recent common ancestry. A. R. Wallace suggested a different view which inclined rather more toward the polygenist position (1870, 1891: chap. 8). He argued that the various racial types had become differentiated before the final stages in the emergence of humanity from the apes. Each racial group had completed the last phases of the development independently. Wallace, unlike many of his contemporaries, was prepared to allow that all branches had attained the same level of mental development.

For exponents of parallel evolution such as Cope and Haeckel, the races were distinct species, even though they could interbreed, because they had been separated from one another for so long. The most extreme form of this model was Carl Vogt's theory in which the split went all the way back to the apes, each human species having its origin in a different ape. The whites came from the chimpanzee, blacks from the gorilla, and the oriental races from the orangutan. This was always a minority view, although one occasionally expressed even in the early twentieth century (Bowler 1986). But its influence was felt among those paleoanthropologists who began to argue that there were multiple lines of human evolution, with some of those lines, including the Neanderthals, being driven to extinction at a later stage in the process. The theories in which many lines independently evolved toward the goal of becoming human were the last expression of the developmentalist viewpoint. Only within this framework of vast antiquity for even the living races did the more extreme form of white supremacy maintain a tenuous link with science. The Nazis' claim that the fair-haired Aryan was a distinct and superior form of humanity destined to rule the "sub-men" of other types had its origin in a cultural tradition which drew on many other factors besides the sciences of physical anthropology and evolutionism (Mosse 1978; Poliakov 1970; Tennenbaum 1956).

In America, the race question was focused on the problems created by slavery and the difficulties encountered by emancipated slaves after the Civil War (J. Haller 1975; Smedley 1993). We have noted the efforts of neo-Lamarckians such as E. D. Cope to define the blacks as relics of the evolutionary past. In the twentieth century, biologists and paleontologists such as H. F. Osborn continued to claim that the races were distinct species which had evolved in isolation. They exploited the prevailing view that many apparently closely related forms were independent products of parallel evolu-

tion. There were close links between American race scientists and those working in Nazi Germany (Kuehl 1994). The race question was also important in the American eugenics movement (see below).

Opposition to race science began among anthropologists and social scientists in the early years of the twentieth century (Cravens 1978). For some time, social scientists and biologists battled for supremacy over this issue, with Franz Boas himself suffering considerable persecution, both professional and social, from the powerful race lobby within American biology. Only gradually in the 1930s did some more liberal biologists, including Julian Huxley, begin to throw off the legacy of racism (Barkan 1992). The emergence of the Darwinian synthesis did much to discredit the theories of parallel evolution on which the more extreme theories of racial differences were based. In the end, however, the challenge to the race science of the early twentieth century was created by the growing sense of horror at the extremes to which the Nazis pushed their drive to eliminate the Jews and other racial types deemed undesirable by their ideology.

SOCIAL EVOLUTIONISM

The classic image of social evolutionism focuses on the mechanism which was supposed to drive the escalator of progress. It was easy to assume that a more challenging environment was the spur which developed improved mental powers, and the image of a people struggling against the limitations imposed by nature easily took on Darwinian connotations. A more direct link with the Darwinian theory could be made by suggesting that competition within the species was crucial for progress, either at the individual or the group level. The classic and much-maligned concept of social Darwinism is the assumption that struggle is the motor of progress, spurring on development and weeding out those who do not keep up. But social Darwinism could be expressed in many forms: beginning as a link between free-enterprise capitalism and the Darwinian theory of individual competition, the ideology of progress through struggle was increasingly transferred to the level of national or even racial competition. Nor was Darwin's theory the only way of forging a link between biology and social thought. The idea that struggle spurred individual self-improvement had distinctly Lamarckian overtones, and many who welcomed the concept that the elimination of "unfit" races occurred as a part of evolution did not believe that the original racial differences were created by natural selection. Selection

was only one among many models of evolution, but use of the term *social Darwinism* blinds us to the role of non-Darwinian ideas in promoting harsh social policies.

Lamarckism required one to believe that individuals are not totally constrained by their biological inheritance. For new characters to be acquired and transmitted, inheritance had to be "soft" enough to allow for some modification. But natural selection included no such requirement: heredity could be "hard" in the sense that it allowed no room for individual modifications, and still evolution would occur because only the fit individuals would transmit their rigidly defined characters. Even Darwin himself did not believe that heredity was as hard as this, but in the later nineteenth century there was a growing conviction that heredity defined the individual's capacities and temperament so rigidly that no modification was possible. Nurture (environment and upbringing) was incapable of altering what nature (biological heredity) had predetermined. Although the selection theory played a role in fostering this belief, it was not the only source, and the Mendelian genetics of the early twentieth century was equally hereditarian in outlook without being sympathetic to the selection theory.

Social Darwinism

The area where evolutionism impinged most obviously on social thought was the implication that there might be a struggle for existence among individuals, nations, or races. This points us toward the controversial topic of social Darwinism, the use of the Darwinian notion of struggle to justify social policies in which there was little sympathy toward those who could not support themselves. But the possibility of a social Darwinism focused on race conflict (see below) highlights the complex nature of the analogy between natural selection and human struggle. The most prominent form of social Darwinism stressed not racial or national struggle but the individual competition which flourished in free-enterprise capitalism. The two levels of struggle—between individuals and between groups—are not necessarily compatible, because the late-nineteenth-century imperialists who worried about their nation's status in the world wanted a strong central government which would limit commercial rivalries. There is no single form of social Darwinism, only a complex of often contradictory ideologies exploiting the model of the survival of the fittest in different ways (Paul 1988). To make the situation even more complex, Darwinian natural selection was not the only means of articulating struggle as either a scientific theory or a social philosophy. The expectation that struggle promoted individual self-improvement generated an ideology based on Lamarckian rather than

Darwinian evolutionism, if those improvements were supposed to contribute to the progress of the race. It is often assumed that any social philosophy advocating struggle must be Darwinian, but for this to be logical, the term *Darwinian* must be used in a broad sense which goes far beyond the detailed theory of natural selection.

The whole subject generates endless controversy, the arguments being all the more heated because they bear upon issues still relevant today. The term *social Darwinism* was introduced only in the late nineteenth century and was used from the start in a pejorative context (Bellomy 1984). To call someone a social Darwinist was to insult them by implying that they had abandoned all moral standards to make success the only criterion for what is good. Those who portray modern interpretations of human nature as direct continuations of the harsh Darwinian viewpoint of the late nineteenth century use history to label those interpretations as morally unacceptable. The ideological debate is polarized between the right and the left: socialists see any attempt to reduce humans to the level of animals struggling with each other as an illegitimate use of science to bolster right-wing ideologies. The debate also bears on the question of scientific objectivity, because opponents of social Darwinism often regard Darwinism itself as an illegitimate projection onto nature of values derived from the ideology they distrust (Young 1985). Scientists seeking to defend the independence of their theorizing from social constraint are branded as social Darwinists because they will not admit that Darwin derived any inspiration from his social environment. For the anti-Darwinians, it is obvious that the importation of right-wing ideology into science was necessary so that science could be presented as objective evidence for the inevitability of humans behaving in a selfish manner.

The classic expression of the view that late-nineteenth-century social thought was dominated by the Darwinian metaphor of the struggle for existence is Richard Hofstadter's *Social Darwinism in American Thought* (1959); for a more recent exposition see Mike Hawkins's *Social Darwinism in European and American Thought* (1997). But Hofstadter's account acknowledges that there were many different forms of social Darwinism besides the classic justification of capitalism. Some historians, especially Robert C. Bannister (1979), argue that the level of support for an ideology of struggle has been overestimated, and that the direct input from Darwinian biology is obscure (see also Bowler 1993; Fichman 1997; Halliday 1971; Heyer 1982, G. Jones 1980; Rogers 1972). Bannister has been attacked for giving credence to those who seek to portray science as purely objective. His approach certainly implies that we should be careful not to assume that

every casual reference to struggle as the driving force of progress reflects a considered evaluation of Darwin's theory. But the critics have a point when they argue that the influence of Darwinism may be pervasive at a level which reflects rhetoric and metaphor rather than detailed scientific analysis. Bannister's critique is better understood, however, as an attempt to suggest that there were also non-Darwinian evolutionary ideas that could be used as social models. The aim is not to whitewash Darwinism but to show that the whole range of evolution theories available at the time was incorporated in the effort to portray biology as a foundation for social thought.

The disagreements among historians are reflected in the debate over Darwin's own views on society (J. Greene 1977). Opinion ranges all the way from accusations that he openly promoted aggressive individualism (Harris 1968) to denials that he had any sympathy for such views (Freeman 1974). Unfortunately, Darwin's writings contain passages that can be interpreted in favor of both positions. He was aware of the role played by the model of economic individualism in his thinking, especially as expressed in Malthus's population principle. He saw both individual and tribal struggle as important in human evolution, and feared that the relaxation of selection within a civilized society (where charity helps the unfortunate to survive) would harm the race by allowing the unfit to breed. Yet he was surprised when a newspaper article accused him of justifying the actions of Napoleon and of tradesmen who cheat. For Darwin, at least, "fitness" in the human context did not include the kind of immorality which would justify any action by the motto "Might is right." The fit were the able and energetic, not those who cheated or forced their way to success.

Darwin's liberalism was a long way short of the ruthless individualism worshiped by some successful industrialists (G. Jones 1980). He certainly wanted to restrict the powers of the landed aristocracy, who, he believed, had no hereditary right to rule. But he accepted that there was a natural aristocracy of talent which should have the freedom to rise to the top in every generation. The debate between Darwinism and conservative religious thought can be seen in part as an element in the bid by the new commercial and professional elite to gain power in society (Desmond 1982; Desmond and Moore 1991; Turner 1978). Darwin himself came to play the role of a country squire at Down House, and James R. Moore (1982) argues that his burial in Westminster Abbey was used by his followers to establish their position as the new ruling class. But selfishness had no role in the ideology of Huxley and the other professionals, many of whom worked endless hours in education and public service for only limited reward. The problem would come when critics began to argue that the unfit poor were proliferating in

the slums precisely because of the efforts made by the new rulers to protect them from disease and starvation. Then it might become necessary, according to this argument, for the state to play a role in regulating human reproduction.

The more ruthless form of individualism is usually associated with the name of Herbert Spencer, although as R. J. Richards (1987) and other have argued, Spencer—like Darwin—would have been horrified at the thought that his philosophy was being used to undermine moral values. His Synthetic Philosophy became the most broadly articulated version of the progressionist philosophy into which Darwinism was received. Spencer accepted natural selection as an important mechanism of biological evolution, and he coined the phrase "survival of the fittest." He was also an exponent of an extreme laissez-faire individualism, seeing the struggle between individuals jockeying for position as the driving force of social progress (Kennedy 1978; Peel 1971; Taylor 1992). His ideas were welcomed with enthusiasm by the robber barons who masterminded the development of American industry in the late nineteenth century. It is easy, then, to see why Hofstadter should take Spencer as the archetypical social Darwinist, responsible for transmitting this harsh philosophy of progress through struggle across the Atlantic. Spencer's opposition to socialism was based on the assumption that state support for the poor would encourage them to be idle. In his later life he came to place increasing emphasis on the fear that a state-funded welfare system would permit an ever greater number of "unfit" people to survive and breed, thereby undermining social progress (see his 1884 book *The Man versus the State,* reprinted in 1969). But Spencer was a biological Lamarckian, and an equally important aspect of his support for free enterprise was his belief that competition would stimulate individuals to improve themselves. The aim was not so much to eliminate the unfit as to make everyone fitter, and in this sense Spencer's ideology endorsed the Victorian sense of the need for personal development articulated in Samuel Smiles's classic book, *Self-Help* (1859; see also Jarvis 1997). Since the acquired improvements were supposed to be transmitted to future generations, this was more social Lamarckism than social Darwinism. But because struggle was seen as the spur to progress, the Lamarckian element has gone largely unnoticed by later writers. The emphasis on the virtues of thrift, industry, and initiative was an attempt to revise the old Protestant work ethic, and for this reason Spencer's apparently agnostic philosophy was welcomed by some liberal religious thinkers (Moore 1985a).

At the same time, however, Spencer's gospel of progress through struggle was seized upon by those who advocated a more ruthless social policy

which really did seem to abrogate all traditional moral values in favor of the worship of success at any price. This was especially the case in America (Hofstadter 1959; for a collection of primary sources, see Ryan 2001). The Yale economist William Graham Sumner endorsed the motto "Root, hog, or die" and challenged anyone to displace him from his position by displaying superior ability. Idleness and inefficiency would be punished by miseries inflicted by nature itself. Yet Sumner seemed more concerned about the struggle of the human race as a whole against the limitations imposed on it by the natural environment. This concern may have been expressed in Darwinian language, but it deflected attention away from the competition between individuals. Leading American industrialists also claimed that Spencer's philosophy justified their own enthusiasm for unrestricted competition. Andrew Carnegie became his avowed disciple, while John D. Rockefeller and the railway magnate James J. Hill used the phrase "survival of the fittest" to endorse the capitalist system. In their view, the fact that the most successful firm drove its competitors into bankruptcy simply allowed the most efficient producer to dominate the market, thereby ensuring economic progress.

Hofstadter's claim that these endorsements illustrate a widespread enthusiasm for free-enterprise social Darwinism has been disputed (Bannister 1979; Russett 1976; Wyllie 1959). Sumner did not, in any case, hold out much hope for social progress in the future. Many small businessmen, fearful of being gobbled up by their more powerful competitors, openly called for the state to restrict competition. The capitalist form of social Darwinism was self-defeating—the goal of every industrialist was to achieve a monopoly, thereby eliminating all rivals and hence all further competition. Nor did the concentration of wealth in the hands of a few able individuals guarantee that the resources would be well-used by their children—the families of the rich often became drones who lived a life of luxury while employing managers to look after their affairs. Carnegie realized that he should use his wealth for the public good by founding libraries and other institutions that would help ordinary people improve themselves. The analogy between commercial competition and natural selection is so vague as to be virtually meaningless, because the inheritance of wealth does not correspond to the inheritance of biological qualities.

Racial and National Conflict

By the end of the century, Spencer's influence was already waning in Britain, although he seems to have kept a stronger hold on the American imagination. This was in part because the enthusiasm for unrestrained free

enterprise was being overtaken by an ideology of imperialism, which focused attention on the white nations' efforts to conquer or colonize the rest of the world and on the resulting national rivalries. In this era, another form of social Darwinism seemed more appropriate: perhaps the main focus of the struggle for existence was between the races of humankind or between nations within the dominant white race. Even those who distrusted natural selection could accept that the struggle for existence would eliminate the less successful of nature's productions. Many now began to claim that the domination of one race or nation over another was a natural part of the process by which the human species had advanced.

Darwinism implied that species and races must compete for territory. Not everyone accepted this struggle as inevitable, because some thought it was impossible for a race to adapt properly to a territory different from the home in which it evolved. But the success of whites in conquering and settling territory in America and Australia made it difficult to sustain this view. There was an increasing assumption that populations would try to expand into new territory, and thus would compete with the indigenous races. Darwin himself seemed to endorse this racial struggle, as in the subtitle of the *Origin of Species:* "The Preservation of Favoured Races in the Struggle for Life." This was not the main driving force of natural selection, but competition between species and varieties was an important subsidiary theme within Darwinism, and the image of racial competition is thus a genuine form of social Darwinism. Some even thought that blacks in America would decline to extinction once freed from the protection offered by slavery. The Darwinist Karl Pearson welcomed whites' conquest of the world: "It is a false view of human solidarity . . . which regrets that a capable and stalwart race of white men should replace a dark-skinned tribe which can neither utilize its land for the full benefit of mankind, nor contribute its quota to the common stock of human knowledge" (Pearson 1900: 369). Pearson did at least accept the theory of natural selection working within populations, but many of those who promoted race conflict did not, attributing the actual origin of races to Lamarckian or orthogenetic factors. Paleoanthropologists such as Arthur Keith compared the extinction of the Neanderthals with what was happening to the natives of America and Australia—and saw these replacements as essential to human progress. In this respect, at least, the Nazi theory of Aryan supremacy was not significantly different from the form of racial Darwinism prevalent among many scientists in the early twentieth century.

Pearson and Keith's confidence in the white race's ability to expand its territory was not universally shared. Pearson himself became concerned

about the extent to which Jews from eastern Europe were multiplying in the East End of London. In America—where there was a much greater flow of immigrants from both Europe and the Far East—the threat that the biological character of the white race might be undermined by faster-breeding but intellectually inferior races became a major concern. Race thus played a role in the emergence of the eugenics movement (see below). The assumption that a race's superior mental abilities guaranteed its success had seemed natural in the age of imperialist expansion, but the more pessimistic worldview of the early twentieth century acknowledged that the rate of reproduction might be far more important in the long run.

Europeans were convinced of their superiority over other races, but there were major rivalries among the European nations themselves. In the late nineteenth century, a wave of nationalist fervor swept through many countries, fueled by the West's increasing power to dominate the world. Everyone wanted their share of the economic benefits of conquest and colonization. National hostilities were sharpened, and the result was a return of militarism—denounced by Spencer as a return to a more primitive social organization. The intensification of national rivalries offered another level at which the Darwinian model could be applied, since each nation could feel that it was struggling to demonstrate its superior "fitness." But only a strong central government could guarantee success in this national struggle for existence—the free enterprise advocated by Spencer would undermine solidarity because individuals or firms would seek private profit at the expense of the nation's long-term interests.

This transition from an individual to a national struggle for existence had already been made in Walter Bagehot's *Physics and Politics* (1872). Setting out deliberately to apply the principle of natural selection to society, Bagehot argued that, throughout history, the strongest nations have always dominated their neighbors, and that the strongest have always been the fittest, in the sense that they have contributed more to the development of civilization. Inferior nations might not be eliminated in the struggle, but they would be subjugated and taught the advantages developed by their conquerors. Bagehot's alienation from the spirit of the individualistic selection theory is evident in the fact that he saw the increasing power of governments as essential for progress. Anything that helped the state to control unruly individuals was a benefit, including religion. Church and state should unite to suppress freedom of thought in the name of national unity.

Bagehot's views were anathema to the British enthusiasts for free enterprise, but as the century progressed toward its end, Britain became caught up, along with the other European countries, in international rivalry (Crook

1994). In France, too, competition between nations was assumed to be the most obvious social extension of Darwinism (L. Clarke 1984). In Germany, however, the nationalist form of social Darwinism became more explicit. In the years preceding World War I, the German general Friedrich von Bernhardi wrote openly of his newly united nation's desire for conquest and claimed that this would be justified because it allowed the superior German culture to displace inferior rivals in a struggle for existence. Ernst Haeckel, originally a liberal, threw his weight behind Germany's assertion of its role as Europe's leading culture. He endorsed Germany's position when war finally broke out in 1914, and was bitterly disappointed when Germany was defeated. Haeckel had developed a philosophy of "monism," in which spirit and matter were different aspects of the same underlying substance (Di Gregorio 1992; Holt 1971; Weindling 1989a). His Monist League promoted this philosophy throughout Germany and linked it with an ideology of German supremacy. The league's subsequent influence on the rise of Nazism has been stressed by Daniel Gasman (1971; see also Zmarzlik 1972; on Haeckel's influence on fascism in other countries, see Gasman 1998). Gasman's account has been challenged by other scholars, who see Darwin's influence as more pervasive and hence as affecting a variety of different political philosophies (e.g., A. Kelly 1981). The views expressed by Haeckel were typical of many contemporary right-wing intellectuals, not all of whom were influenced by Darwinism, although they may have exploited the metaphors provided by the selection theory. Significantly, the philosopher Friedrich Nietzsche—who gained notoriety for his proclamation of a new morality based on "might is right"—repudiated any link with the Darwinian theory in biology (Bannister 1979; Call 1998). Nevertheless, many British and American biologists were worried that Darwinism's name had been tainted by its association with German militarism. The American biologist Vernon Kellogg visited the German army occupying Belgium in the early part of World War I and reported that the officer corps was pervaded by the ideology of nationalist social Darwinism. For this reason, some biologists were encouraged to persevere with the non-Darwinian theories promoted during the "eclipse of Darwinism" (Mitman 1990).

Alternatives to Social Darwinism

Darwin's theory has acquired a reputation for promoting ruthless social attitudes. But the use of Darwinian catchphrases such as "the survival of the fittest" by a variety of right-wing thinkers creates an exaggerated sense of the theory's influence and conceals the fact that many had only the vaguest understanding of science. Modern scholars have noted a wide range of social

applications of the theory which went against the spirit of ruthless social Darwinism (G. Jones 1980; A. Kelly 1981). Even socialists could gain some comfort from the theory while repudiating the idea of struggle at both the individual and the national level (Pittenger 1993). The codiscoverer of natural selection, Alfred Russel Wallace, wrote actively in support of socialism and found a justification for the ideology in the Darwinian theory (Durant 1979). He argued that the inheritance of wealth distorted people's choice of a marriage partner: a biologically fit individual might be tempted to marry someone of inferior character because the latter had inherited a fortune, thereby weakening the constitution of the race as a whole. If equality of wealth were imposed by a socialist government, the fittest individuals would naturally tend to partner one another, to the benefit of the race. Wallace's vision of a biological rationale for social equality was by no means unique (Weikart 1999). The socialist politician J. Keir Hardy referred to group selection to argue that progress was achieved through the success of those groups in which the individuals felt sympathy for one another. In the end, though, this line of argument was developed more by those who favored the Lamarckian theory.

One possible link between socialist ideology and Darwinism has been exaggerated, however. It is sometimes implied that Darwinism was associated with the philosophy of Karl Marx (e.g., Barzun 1958), and at one time it was believed that Marx had offered to dedicate a volume of his *Capital* to Darwin. Marx and Engels certainly welcomed evolution theory because of its support for a materialist view of human nature. But they also realized from the start that there was an analogy between natural selection and the capitalist system of economic competition, and so were suspicious of Darwin's theory. Marx's concept of class struggle has different roots lying in Hegel's idealism—in the clash and synthesis of coherent social entities reflecting the stages of social evolution rather than competition between individuals or tribes (Heyer 1982). We now know that the claim that Marx offered to dedicate his book to Darwin was based on a misunderstanding of the relevant correspondence (Colp 1974, 1982; Fay 1978; Feuer 1975; on Marx and Darwin, see Pancaldi 1994). In the twentieth century, Soviet communism was always hostile to the Darwinian theory, and Lamarckian theories such as Lysenko's flourished in Soviet Russia.

By the end of the nineteenth century, confidence in the assumption that struggle is the driving force of progress was undermined by a growing fear that human civilization was no longer, in fact, permitting the struggle to take place. It might even be weakening the constitution of the human race by creating artificial environments and stresses that people could no longer

cope with. Some now feared that progress would be replaced by degeneration as the human race undermined the very forces which had created it (Bowler 1989c; Chamberlin and Gilman 1985; Pick 1989). The French social writer Max Nordau achieved wide notoriety after publication of his *Degeneration* (1895) proclaiming the effects of nervous stress created by modern living. On a very different tack, the evolutionary biologist E. Ray Lankester called attention to the possibility that a civilized lifestyle might be so lacking in challenges that the external stimulus necessary for the species to progress was diminished. Whatever the mechanism of adaptive evolution, species only progressed when they faced a challenge from the environment. Just as some animal groups had degenerated when they took up a sessile life on the seabed, so humanity might slip back from the standards achieved by the ancient Greeks and Romans once all material wants were met. As Lankester put it, "Possibly we are all drifting, tending to the condition of intellectual Barnacles or Ascidians [sea squirts]. It is possible for us—just as the Ascidian throws away its tail and eye and sinks into a quiescent state of inferiority—to reject the good gift of reason with which every child is born, and to degenerate into a contented life of material enjoyment accompanied by ignorance and superstition" (1880: 61).

It is significant that when H. G. Wells came to write his science fiction story *The Time Machine,* depicting a future human race reduced to bestiality and futility, he had been reading Lankester's warnings. Faith in the idea of progress, central to any form of social Darwinism, was now beginning to crumble as late-nineteenth-century thinkers realized that industrial civilization was a mixed blessing.

BIOLOGICAL DETERMINISM

One response to this more pessimistic view of social evolution was the eugenics movement, which called for governments to impose a breeding program on the human race. In an age of increasing reliance on management by experts, why not let the experts on heredity determine who should have children and who should not? The problem with free-enterprise social Darwinism was that it was ineffective if one thought in terms of the human race's biological character. The "fittest" people, those with enough intelligence and initiative to gain a dominant place in society, might gain more wealth and power, but they were notorious for limiting the number of children in their families. Meanwhile, the least able and energetic drifted into the slums of the great cities where, in an age of better public health, they

managed not only to survive but also to breed prolifically. Far from natural selection weeding out the unfit, in a civilized society it was the unfit who produced most of the next generation. Darwin himself had worried about this, and by the end of the century the eugenics movement was openly pleading for a policy of artificial selection applied to the human race.

Eugenics typified the increasingly popular ideology of genetic determinism, the claim that a person's character and abilities were predetermined at birth by the power of inheritance. In a sense, the racist policies discussed above express a form of this ideology, since they assume that an individual's character is fixed by the race to which the person belongs. For this reason, race could also play a role in eugenics policies. But the fully developed eugenics of the early twentieth century insisted that even within the race, individual character was biologically predetermined. All too often, it turned out that when the expected differences were mapped onto the social classes, the poor class contained the larger proportion of unfit individuals.

There were other forms of genetic determinism, however, one obvious version being the widely held opinion of Victorian men that women were intellectually inferior. There are remarkable parallels between the applications of the determinist ideology in the areas of race and gender. Yet the late nineteenth and early twentieth centuries by no means were dominated by the determinist model of human nature. There had always been those who had insisted that the individual is shaped not by heredity but by environment and upbringing. In the twentieth century, the social scientists proclaimed their independence from biology by stressing this aspect of human nature. But there were biologists, too, who emphasized the role of the environment, and this model could be linked to evolutionism by exploiting the Lamarckian theory of the inheritance of acquired characters. If people could be improved by education, perhaps the benefits could be passed on by heredity to become part of the character of the whole race.

Eugenics

The Darwinian selection theory played a role in the emergence of the eugenics program. Thus, eugenics may be counted as a form of social Darwinism—although it is a form which violates every principle of the free-enterprise version popularized by Spencer. Eugenics had a closer link with the nationalist form of social Darwinism, since one argument for improving the biological fitness of the population was to resist the threat posed by rival powers. But the movement also drew on another biologically inspired view of human nature which acquired a momentum of its own, independent of evolution theory. The logic of eugenics rested on the ideology

of hereditary or genetic determinism. No amount of education or improved conditions could modify the characters imposed by the genes. In the great debate over whether nature or nurture determined a person's abilities, eugenics was firmly on the side of nature (Pastore 1949). Once this point was accepted, the policy of selective breeding could be supported without reference to evolution theory. It did not matter where the bad genes came from, if they existed, they should be prevented from reproducing. Many of the early geneticists were not Darwinians, and much of the modern controversy over the role of the genes in determining human characters takes place without reference to evolution.

Whatever these later developments, the link between eugenics and Darwinism was initially very strong. Darwin's cousin, Francis Galton, first proposed methods of testing the strength of heredity in predetermining character and called for policies to manipulate the race's biological constitution. He coined the term *eugenics* in 1883. Although he himself favored the theory of evolution by saltation, he accepted that selection was the best way of maximizing the fitness of each population, while his disciple, Karl Pearson, founded the biometrical school of Darwinism. Ronald Aylmer Fisher, one of the founders of the modern genetical theory of natural selection, was also a convinced eugenicist. With the emergence of genetics, however, the logic of hereditary determinism took on a life of its own, supported by various social groups with an interest in arguing that expensive reforms benefiting the poor were a waste of money (for general surveys, see G. Allen 1975b, 1976; Bajema 1977; Blacker 1952; Bowler 1989b; Farrall 1979; Kevles 1985; Roll-Hansen 1988). Some have argued that eugenics was essentially a movement of the professional middle classes, who were convinced of their own high qualities and worried that state-sponsored reform programs would require high taxation. It was popular among those who wanted a well-managed society with themselves as the managers (Semmel 1960). For this reason, eugenics was occasionally taken up by left-wing thinkers, although it is normally associated with the political right (Paul 1984). Even Pearson called himself a socialist (1894), although by this he meant an enthusiast for a strong central government.

Galton began to advocate the importance of heredity in human character in the 1860s as a means of gaining recognition among the Darwinian circle (Waller 2001a). He had made an expedition to Africa during which he had become convinced of the white race's superiority over the black (Fancher 1983; on Galton's life and work, see Buss 1976; Cowan 1977; Fancher 1983; Forrest 1974; Gilham 2001; Pearson 1914–30). He now looked for a similar form of biological determinism within the white population, and used care-

ful pedigree studies to argue that high levels of intelligence ("genius") tended to run in families. His *Hereditary Genius* of 1869 (reprint 1892) developed his case and explored the implications of this hereditarian viewpoint for the future of humanity. Hereditarianism was the ideal foundation for Galton's pioneering efforts to apply a statistical method to biological problems (Waller 2002). Galton was already convinced that the poorest individuals were breeding faster than those with high levels of intelligence, the latter forming mostly the professional and commercial elites. The drive to halt the resulting decline in the quality of the race became a moral crusade for Galton. He wanted a "positive eugenics," in which the most able individuals would be encouraged to have more children, although later he came to place much more emphasis on "negative eugenics," in which the state would compel the unfit poor to breed less.

In some respects Galton's fears about the transmission of harmful characters only echoed a common Victorian theme about the possibility of a "hereditary taint" such as insanity in a family bloodline (Waller 2001b). But his assumption that no amount of improved conditions or education could raise the intellectual standard of someone with bad heredity flew in the face of the liberal ideology of self-help. His warnings were ignored at first, and Galton's subsequent efforts to develop statistical techniques in biology were intended to back up his position (Cowan 1972b). Eventually he was joined by Pearson, who refined Galton's statistical methods and used them to found the biometrical school of Darwinism. Pearson pointed to the poor quality of the recruits coming into the British army for the Boer War to illustrate the decline of the nation's biological fitness and the dangers this posed for the empire. In the early years of the new century, the eugenics movement finally expanded to become a serious lobby group seeking to change government policy. The Mental Deficiency Act of 1913 was eventually passed by Parliament, ensuring in theory that those diagnosed as having low intelligence would be institutionalized and prevented from bearing children. Galton was the figurehead for the movement, although he had played a negligible role in building up popular support—serious political action was never his strong point. He did, however, found a National Eugenics Laboratory in 1904 and soon afterwards headed the Eugenics Education Society (on British eugenics, see Barker 1989; G. Jones 1986; Mackenzie 1976, 1982; Mazumdar 1992; Searle 1976, 1979).

In America too, eugenics flourished in the early twentieth century (M. Haller 1963; Ludmerer 1972; Pickens 1968). The American Breeders Association, a Mendelian group, set up a Eugenics Committee in 1906, and in 1910 the Eugenics Records Office was founded (G. Allen 1986). Efforts

were made to trace the alleged hereditary taints of insanity, feebleminded-ness, and immoral behavior through generations of poor families. Thanks to constant lobbying, a number of states set up programs requiring the compulsory sterilization of the mentally handicapped. One side effect of the movement was the support it provided for the development of intelligence tests that would simplify the identification of the feebleminded (Evans and Waites 1981; Gould 1981).

Eugenics became popular in many other countries (Adams 1990). The first International Eugenics Congress was held in 1912. A well-established eugenics program existed in Germany long before the Nazis came to power in 1933 (Weindling 1989b; Weingart 1989; Weiss 1986, 1988), although the Nazis certainly applied far more extreme methods to sterilize and ultimately to liquidate the "unfit" (Harmsen 1955).

The influence of eugenics on the biology of the time has been widely debated by historians. Donald Mackenzie (1982) argues that the statistical methods developed by Galton, Pearson, and Fisher were shaped by their desire to provide support for hereditarian social policies. This would imply that biometrical Darwinism and population genetics both were contaminated deeply by ideology. Eileen Magnello (1999) has shown, however, that Pearson's research on human heredity used techniques different from his biometrical Darwinism and was kept institutionally separate. Fisher is a more complex case. He was certainly a convinced eugenist: his wife eventually left him because he insisted on having a large family to perpetuate his own superior genes. Yet his own work demonstrated that eugenic policies would be ineffective except on an enormous timescale, even if the basic hereditarian principle were valid (Bennett 1983; Depew and Weber 1995; Norton 1983). It must also be remembered that Pearson rejected Mendel's laws as the basis for a reformulation of Darwinism, while many early geneticists in turn rejected the selection theory. In America, genetics rather than Darwinism provided the central biological support for eugenics, with early enthusiasts such as C. B. Davenport insisting that there was a single gene for each identifiable character, including feeblemindedness. The Mendelian eugenists claimed it would be easy to identify those carrying the harmful genes and prevent them breeding, thus purifying the race within a few generations. It was soon pointed out that if the relevant genes were recessive (i.e., they did not manifest themselves when combined with a "normal" gene), it would be much more difficult to identify the carriers. This was why Fisher's work showed that selection—while effective on an evolutionary timescale—was too slow to be an efficient social policy.

The enthusiasm of some evolutionists and geneticists for eugenics can-

not be doubted, and although scientific support began to wane as the difficulties became apparent, many biologists refused to speak openly against it (Gould 1974a; Ludmerer 1972; Provine 1973). But the suggestion that theoretical developments were distorted by this ideology is less easy to sustain, given the very different theories of heredity proposed at the time. It was even possible for a Lamarckian to be a eugenist, as demonstrated by E. W. MacBride, who wanted to see the Irish component of the British population reduced (Bowler 1984).

MacBride's shifting of the focus from social class to race was not typical of the British eugenics movement. In America, however, race became a central theme of eugenic concern. Given the large number of freed black slaves and the ever-increasing flood of immigrants from eastern Europe and Asia, white Americans began to fear that the biological quality of their race would be contaminated by fast-breeding but inferior types. A host of writers harped on this theme and called for the influx of immigrants to be stopped (Burr 1922; Fairchild 1926; Grant 1918; Ross 1927). Their campaign was crowned by the passing of an Immigration Restriction Act in 1924. American eugenics thus concentrated on both the purification of the white race and the effort to prevent it from being contaminated by blending with genetically inferior types.

By the late 1930s, all strands of biological determinism were coming under suspicion as the excesses of the previous decades came to a head in Nazi Germany. Biologists now recognized that few characters are controlled by single genes, while the difficulties created by the existence of recessive genes made the hope of purifying the human race seem an illusion in practical terms. More important, even those biologists who accepted the importance of genetics now conceded that environment was crucial too. We cannot fairly assess the genetic difference between two individuals if one has been raised in middle-class comfort and the other has been raised in a slum. If R. A. Fisher remained an enthusiast for eugenics, the other British founder of the genetical theory of natural selection, J. B. S. Haldane, became a Marxist and campaigned against it on the grounds that all people had to be given a decent standard of living before one could even begin to think of assessing their genetic potential (Haldane 1938; see also Werskey 1978). Long before this, social scientists and psychologists had turned against the hereditarian viewpoint. For them, the human ability to learn and acquire a culture was far more significant in determining how people behave (Cravens 1978).

The subsequent history of the debates over genetic determinism lies outside the scope of this book, since much of the enthusiasm for a revival of the hereditarian position has been driven by hopes raised by the improvements

in genetics. The opponents of hereditarianism have promoted many programs for social improvement, and these have often failed to produce the expected benefits—but is this because those who were offered help were genetically incapable of benefiting from it, or because the reforms were superficial (Gould 1974a)? More recently, the expectations raised by the Human Genome Project have encouraged people to think once again in terms of single genes determining single characters. The use of genetic counseling to discourage those with hereditary defects from breeding has raised the specter of a new eugenics based not on state control but on social pressure to conform (Paul 1998).

Biology and Gender

A parallel form of determinism focused on the question of gender; indeed, some of the arguments used to define women's place in society were remarkably similar to those use by the race theorists. Late-nineteenth- and early-twentieth-century biologists and social scientists, almost all of them men, were anxious to preserve a social order in which women occupied an inferior position. Invoking a biological foundation for the alleged inferiority of female intelligence, or for the assumption that women's role as mothers made them unfit for an active life outside the home, was a natural tactic for these men to use. Darwin's theory of sexual selection seemed to reflect Victorian stereotypes about what was "natural" behavior for males and females and thus formed another source of prejudice. It has even been suggested that the theory of natural selection itself reflects an essentially masculine view of nature, because of its emphasis on the role of struggle (Easlea 1981). When carried to this extreme, the analysis betrays a flawed understanding of history because it ignores the fact that Lamarckism also emphasized the stimulating effect of struggle. But feminist writers have become increasingly sophisticated at detecting ways in which male prejudice seems to have influenced biological thinking, and there can be little doubt that most scientists in the post-Darwinian decades were certain that women were fated to play a subordinate role (Alaya 1977; Conway 1973; Duffin 1978; Haraway 1990; Russett 1989).

To some extent, evolutionism merely reinforced value judgments attributed to other scientific foundations. T. H. Huxley was not the only anatomist to insist that women's brains were smaller or less convoluted than men's, which was considered a sure sign of intellectual inferiority. Although professing himself a liberal, he campaigned actively to keep women out of the scientific and medical professions (E. Richards 1989b). But his distrust was based on other grounds too: like many of his contempo-

raries, Huxley believed that women were temperamentally unsuited to the rigors of intellectual, professional, and political life. This sense that the female temperament was predetermined by biology found many opportunities to express itself, not all within the context of Darwinism. Herbert Spencer maintained that the female sex had to devote most of its vital energies to reproduction, leaving less for intellectual development (significantly, he conserved his own reproductive energies and did not marry). Like other Lamarckians, he believed that one consequence of this would be the adaptation of the female moral sense to cherish family values rather than the sterner virtues needed to face the world outside the home. The sociologist Patrick Geddes and the biologist J. Arthur Thomson wrote their *Evolution of Sex* (1889) to argue that this fundamental difference of temperament was expressed at the cellular level and dated back to the very origins of sexual reproduction. On this model, if women insisted on trying to get an education or a career, they would undermine their femininity and lose the capacity to reproduce.

Darwin's theory of sexual selection seems to reflect the tendency for male assumptions to become embedded in scientific thinking (Bender 1996; E. Richards 1983). Darwin assumed that males were always self-assertive through either combat or display, while females were passive and coy, waiting to see which male offered the better prospects. It would not be surprising, then, for psychological evolution to have entrenched these instinctive behavior patterns in the two sexes. It would be easy to assume that Darwinism is thus nothing more than an expression of Victorian values masquerading as science, here as in the case of free-enterprise capitalism. That the situation is not quite so simple is evident from the fact that, during the eclipse of Darwinism, sexual selection was even less popular among biologists than natural selection was. The theory may have been a perfect articulation of contemporary male prejudices, but that did not ensure it would be taken up as science. Indeed, it was another hundred years before sexual selection became a key part of modern evolutionism, with the emergence of sociobiology—and that was after the feminist movement had emerged to alert everyone to the issues involved. Feminists also draw attention to the extent to which paleoanthropologists' theories of human origins focused on the role of hunting as the key to our ancestor's success in transforming themselves from apes. Since hunting is assumed to be a male activity, the woman's role as the gatherer and child minder is thus relegated to a subordinate role in the process which made us human (Haraway 1990; see also Cartmill 1993).

The emergence of genetics required a reassessment of the factors which

predetermined the female character, because both sexes were required to transmit the same basic genes (although the recognition that sex is determined by the chromosomes leaves plenty of room for speculation about inbuilt behavioral differences). The eugenics movement concentrated more on persuading middle-class women that to fulfill their duty to the race they had to give up the hope of a career in order to produce children. Modern feminism has attacked such stereotypic images of women's place in society, but the possibility that there might be some biological differences between the male and the female brain, and hence between the sexes' mental faculties, continues to stir debate.

NEO-LAMARCKISM AND SOCIETY

The psychologists and social scientists who opposed the hereditarian position revived the old liberal tradition in which all people were supposed to share a common human nature. Nineteenth-century liberals such as John Stuart Mill had long argued that women and nonwhite races should not be discriminated against on the grounds of any alleged biological inferiority. In the debate over the relative powers of nature and nurture, liberals (and social scientists) were on the side of nurture, because this held out the hope of producing a better society through improved conditions, especially education. But one biological theory blurred the distinction between nature and nurture. The Lamarckian theory of the inheritance of acquired characters implied that a learned habit might eventually become an inherited instinct. Thus improvements made by better education and social conditioning might eventually become part of the race's biological inheritance. Here was the potential for a social evolutionism which did not depend on the Darwinian struggle for existence.

Because Lamarckism is seen as the natural alternative to Darwinism, there has been a tendency for later liberals to regard it as a morally preferable theory (e.g., Easlea 1981; Koestler 1971). But apart from the fact that Lamarckism has turned out to be scientifically unsound, this position ignores the many cases from the historical record where Lamarckians enthusiastically promoted racism, sexism, and even an ideology of struggle. There *is* a reformist interpretation of Lamarckism, and it played an important role by providing an alternative to social Darwinism. But it was by no means the only social interpretation of the theory, and in the rush to identify Darwinism as the principal source of harsh social values, we all too easily overlook the extent to which the rival theory could be adapted to similar po-

litical ends. We have noted the involvement of Lamarckians in the establishment of race science. Herbert Spencer's social Darwinism also had a strong Lamarckian component based on the assumption that struggle was the best spur to self-improvement—Spencer thought that any attempt by the state to impose reforms would only interfere with this process. The rival view of Lamarckism's human implications extended the traditional reformers' belief in the state's ability to generate improved behavior patterns in its citizens via the educational system. Lamarckism held out the hope that the improved behavior would not serve only this generation—eventually it would become an inherited instinct, and human nature itself would have been changed for the better.

The boundaries between the Darwinian and Lamarckian positions were not always clear. In Russia, the prevailing view of Darwinism paralleled that favored by Western socialists: the main struggle for existence was that of the species as a whole against the environment, and it promoted cooperation, not competition, among individuals (Todes 1989). In the 1890s the émigré Russian prince Peter Kropotkin published a series of articles later collected as his *Mutual Aid* (1902). He claimed to have observed animals cooperating with others of their species to survive in the harsh Russian winters. Evolution's main driving force was the development of the cooperative instincts, exactly the reverse of the Darwinian prediction. Kropotkin was an anarchist who believed that the human race eventually would evolve cooperative instincts, making government unnecessary. He later wrote explicitly in favor of Lamarckism, recognizing that, without the inheritance of learned habits, group selection would be required to explain how the cooperative instincts were formed.

In America, too, there was considerable enthusiasm for the Lamarckian view of human nature (Stocking 1962). F. J. Turner's "frontier hypothesis" presented the West as a stimulating environment which worked directly on the constitution of immigrants to produce a superior form of humanity (Coleman 1966). Some members of the American neo-Lamarckian school in biology stressed similar optimistic prospects, especially Joseph Le Conte (1899; see also Stephens 1982). The psychologist G. Stanley Hall saw the development of the child's mind as a recapitulation of mental evolution but also stressed the role of education in shaping further developments (1904; see also Gould 1977b: chap. 5). Hofstadter (1959) notes the writings of Lester Frank Ward as an influential source of opposition to the Darwinian view of society (see also Scott 1976). Ward insisted that our efforts to promote human progress would be wasted if Lamarckism was not valid. It was not enough to improve only the next generation; the whole nature of hu-

manity would have to be transformed, and that could happen only if the improvements society encouraged in people's behavior became inherited as instincts.

In the early decades of the twentieth century, the Lamarckian theory was gradually eliminated from biology by the rise of Mendelian genetics, although the playwright George Bernard Shaw continued to defend it under the name "creative evolution." Shaw's moral indignation against the selection theory was both profound and effective—in the preface to his *Back to Methuselah* (1921: liv), he declared, "If it could be proved that the whole universe had been produced by such selection, only fools and rascals could bear to live." Shaw's vision of the life force struggling to dominate its material environment reflected a brief flurry of interest in nonmechanistic biology at the turn of the century, but it was out of date in terms of the science of the 1920s. One of the theory's last great supporters in science, the Austrian biologist Paul Kammerer, also cited its human implications when trying to defend his work (1924), and he generated newspaper headlines about the breeding of a race of super beings. Arthur Koestler subsequently tried to revive interest in Kammerer's work in his *The Case of the Midwife Toad* (1971). Unfortunately, he praised Kammerer's leading British defender, E. W. MacBride, as "the Irishman with a heart of gold," oblivious to MacBride's explicitly anti-Irish racism (he was an Ulster Protestant; see Bowler 1984). Such slips illustrate how easily the image of social Darwinism can blind us to the harsher implications that can be derived from other evolutionary theories. No one now cites Lamarckism in the hope of improving human nature, and the reformers' plans are limited to changing culture through habits which would have to be relearned in every generation. This does not stop them from invoking the harsh image of social Darwinism in their efforts to brand all forms of biological determinism as morally suspect. It may be worth remembering that one of the most pessimistic predictions about the future of humanity produced in the last century, Aldous Huxley's *Brave New World* (1932, reprint 1955), foresaw social conditioning through learning and environmental manipulation as the means by which our masters might enslave us—all the time claiming that it was for our own good.

EVOLUTION AND PHILOSOPHY

Evolutionary ideas were absorbed into late-nineteenth-century thought in a variety of ways. The worldview of the period was shot through with images of progress and often linked to the idea that some form of struggle or

effort was needed to advance toward higher things. Spencer's was by no means the only philosophy to take this idea as its foundation. But increasingly, people recognized that the trend toward progress might not be absolutely predetermined; evolution could advance in many possible ways, and our actions might decide which of the possibilities would be realized. Many liberal religious thinkers became comfortable with this view of things, content to assume that the human race had retained its dignity as a key step forward in achieving the divine purpose.

The scientific naturalism advocated by Huxley and John Tyndall remained influential into the later decades of the century. Spencer, too, still had a wide audience for his evolutionary philosophy, especially in America. But scientific naturalism had never been popular among academic philosophers; and in Britain, the last decades of the century saw the emergence of an influential idealist movement drawing inspiration from German thought (Copleston 1966). At a more popular level, there was increasing confidence among those who sought to retain a role for mind and purpose in the world—although evolutionism itself remained unchallenged. Idealism was, in any case, well adapted to a developmental view of things, since it saw everything as an expression of mental power. The conservative politician and philosopher Arthur Balfour attacked Huxley's position in 1895, defending an intuitive sense that there was a divine purpose in nature. Huxley died while still composing his response (Lightman 1997). Many other thinkers now were expressing their dissatisfaction with scientific naturalism, often in a form compatible with some type of religious belief (Turner 1974; on the complexity of Victorian science's impact, see Lightman, ed. 1997).

Tensions had emerged even within the scientific naturalists' camp. Huxley at first had been confident in the power of science to dominate nature and had enshrined his lack of religious faith by coining the term *agnosticism* (Lightman 1987). In the later years of his life Huxley himself became disillusioned with the optimistic progressionism of Spencer's philosophy. He saw little evidence that natural evolution was progressive, and became suspicious of Spencer's efforts to found an evolutionary ethics on the basis that whatever succeeded must be defined as good. To be fair to Spencer, he had never held that progress justified mere ruthlessness: his philosophy was meant to show that the virtues of thrift, industry, and initiative triumph in the end. But he had little sympathy for those who could not make the grade, and became increasingly worried that these failures no longer were being eliminated by natural processes. In this sense, Spencer became more of a social Darwinist, while Huxley seems to have become more

aware of the unpleasant implications of a truly Darwinian worldview. Huxley's campaign culminated in his Romanes memorial lecture, "Evolution and Ethics," of 1893 (Huxley 1894; see also Desmond 1997; Helfand 1977; Paradis 1978). Here, he depicted nature as being without purpose or pity, a scene of unrelenting struggle with no apparent tendency for the "fittest" (in any moral sense of the term) to succeed. All efforts to impose order and purpose on this ceaseless activity were illusions created out of vain hope and anthropomorphism. But if evolution was not progressive, why should we accept its harsh values as a guide to our lives? Huxley now presented moral values as something developed in defiance of nature's laws: the human race had somehow transcended the system which gave it birth.

At the same time, Huxley saw no prospect that we could impose our will on the universe to give it a moral purpose. By a cosmic accident, we had been given the power to recognize the meaningless character of the world, and it was precisely that capacity which made us human. But in the end, the world would reclaim its own and civilization would perish. We struggle to maintain our values in a hostile world, not in the hope of ensuring progress but because to do so makes us human. In the twentieth century, such a sense of cosmic pessimism would engender a sense of existential insecurity verging on moral paralysis. But Huxley felt that we had to fight to improve the lot of our fellow humans, hoping to stave off at least for a while the encroachments of a blind and mechanical nature. By opting for unrestrained individualism, Spencer was giving in to nature; Huxley now wanted to take on the world in defense of something like traditional moral values.

This cosmic pessimism, so different from the confident progressionism of the earlier Victorian era, now began to gain a hold in the intellectual world. The early decades of the twentieth century saw thinkers from diverse backgrounds turning their backs on the hope of gaining certain knowledge. Science, the arts, and philosophy all seemed to reflect a concern that the human race had to make its own way in a basically incomprehensible world. This was the movement known as modernism (Everdell 1997). The mood of pessimism it engendered was fueled by the sense of cultural degeneration which swept through Europe at the turn of the century (Chamberlin and Gilman 1985). We have seen how this was reflected in science in the degenerationism of E. Ray Lankester and H. G. Wells (who also studied under Huxley). Huxley's scientific naturalism was repudiated by the new generation of analytical philosophers, but his cosmic pessimism seemed to resonate with the mood of the time. In his essay "A Free Man's Worship" of 1903, Bertrand Russell summed up the image of humanity's place in the world thus:

> That Man is the product of causes which had no prevision of the end they were achieving; that his origin, his growth, his hopes and his fears, his loves and his beliefs, are but the outcome of accidental collocations of atoms; that no fire, no heroism, no intensity of thought and feeling, can preserve individual life beyond the grave, that all the labours of the ages, all the devotion, all the inspiration, all the noonday brightness of human genius, are destined to extinction in the vast death of the solar system, and that the whole temple of Man's achievement must inevitably be buried beneath the debris of the universe in ruins—all these things, if not quite beyond dispute, are yet so nearly certain that no philosophy which rejects them can hope to stand. (1961: 67)

This was exactly what the previous generation had feared would be the consequence of Darwinism's triumph, although many other factors had conspired to drive the point home.

Yet as Russell himself admitted, not everyone shared the intellectual elite's sense of the purposelessness of nature, and some even welcomed a world in which an element of uncertainty seemed to unlock the straightjacket of deterministic materialism. Perhaps the idea of progress could be retained in a less structured form, with the human race as only one possible outcome of the upward strivings of nature. The developmental version of progressionism had imposed a new form of determinism—the goal of evolution was assumed to be inevitable. But the real logic of Darwin's open-ended branching model of evolution was that no such single goal could be identified. In America, John Dewey (1910) argued that Darwinism undermined the hierarchical view of nature and showed us that we have the freedom to shape our own destiny. The concept of freedom was also important to pragmatists such as Charles Peirce and William James (Wiener 1949). They, too, saw that the lesson of Darwinism was its destruction of determinism. Nature was inherently creative, and the lack of constraints on evolution guaranteed the freedom of the individual will. Peirce saw evolution as the growth of "cosmic reasonableness," retaining the idea of progress in a less structured form.

This position was now widely accepted, although paradoxically it was often seen as a form of opposition to Darwinism, so strongly was the selection theory identified with materialism. The clearest illustration of this is the wave of enthusiasm for the French philosopher Henri Bergson's *Creative Evolution* (translation 1911; Gallagher 1970; Grogin 1988). Bergson insisted that there was no harmonious plan of creation, nor any sign of intelligent design in the structure of each species. The history of life was progressive but in an irregular way. This could be explained if we pos-

tulated a creative life force, the élan vital, struggling against the limitations of matter. Evolution strove to progress but was fragmented into a host of separate branches by the need to cope with the material world. Intelligence was one facet of the life force, which had become intensified in the branch leading toward humanity. Our consciousness thus symbolized the creative heart of nature. Bergson's philosophy was welcomed by liberal religious thinkers looking for a way to accommodate the idea of evolution, but it also fascinated a number of scientists, including Julian Huxley.

Similar implications were seen in the "philosophy of organism" proposed by Alfred North Whitehead. Originally an analytical philosopher who worked with Russell on the foundations of mathematics, Whitehead moved toward a vision of cosmic teleology eventually summed up in his *Process and Reality* (1929; see also Emmet 1932). He maintained that the world should be seen not as a collection of discrete objects but as a complex of ongoing processes in which nothing was isolated from the whole. Atoms themselves were quasi-organic entities capable of interacting with their surroundings. Unlike Bergson, Whitehead believed that the processes of nature were meaningful, harmonious, and orderly, with humankind being their highest product. Life and mind were not in conflict with matter but were essential components of a universe in which nothing was completely inorganic or lacking in awareness. It was still possible to recognize a kind of Platonic order in the way processes unfolded, evidence of the God who stood as the ideal toward which the whole universe aspired. There might be no single plan of creation, but the world created its own order in each epoch of history.

The psychologist Conwy Lloyd Morgan proposed his philosophy of "emergent evolution" (1923) to avoid having to postulate that life and mind are present even in so-called inert matter. According to emergent evolution, mental properties began to manifest themselves as a new level of reality only once evolution had reached a certain stage of complexity. Life, mind, and spirit "emerged" at key points in the development of nature and, once formed, began to play an active role in directing further progress. The theme was taken up by Samuel Alexander (1920) and Roy Wood Sellars (1922), Alexander implying that God would be the final emergent reality. The philosophy of emergence has continued to play a role for philosophers and biologists who stress the ability of complex interactive systems to display new properties (Blitz 1992). But for Morgan himself, and for many of his readers, it was yet another way of trying to read a spiritual purpose into evolution. Mind was not the underlying driving force of nature, but it was a level of reality designed to emerge as soon as evolution reached a certain level of

complexity. Once again, progress was retained, but in an unstructured way that implied the possibility of nonhuman forms of mentality.

EVOLUTION AND RELIGION

By the later decades of the nineteenth century, most liberal religious thinkers had accepted the idea that evolution was the unfolding of the divine plan of creation. But tensions remained as liberal theologians pushed for further reassessment of traditional doctrines in order to accommodate the implications of science. Conservatives became increasingly afraid that the basic foundations of Christianity were being undermined rather than modernized. The problem ultimately centered on the doctrines of sin and atonement. Every effort to adapt the faith to evolutionism seemed to center on the assumption that the development of life was progressive and purposeful, thereby displaying God's intelligence and purpose. The human species retained a key role as the final product of organic evolution and the agent by which God's further purpose would be achieved by conscious control of nature. But there was no room in this scheme for the traditional belief that humans were fallen creatures alienated from God and in need of salvation. In the early decades of the twentieth century, these misgivings were articulated in a number of ways. Historians' attention has been mesmerized by the outburst of fundamentalist opposition to evolutionism in America. But this was by no means the only expression of Christian discomfort with evolutionism, nor should that discomfort be allowed to distract us from recognizing the efforts being made to transform the faith in a way that would allow an evolutionary natural theology to emerge (Moore 1979; Numbers and Stenhouse 1999). Other faiths also had to engage with the theory, and Islamic thinkers in particular sought means of confronting Darwinism along with other potentially disturbing Western influences (Ziadat 1986).

In Britain, the Anglican Church endorsed the idea of teleological evolutionism; Charles Gore's edited volume of 1889, *Lux Mundi*, was particularly influential (Elder 1996). Liberal evangelicals in the Free Churches were able to make a similar accommodation (Livingstone 1987; Livingstone, Hart, and Knoll 1999). Henry Drummond's widely read *Ascent of Man* (1894) drew an explicitly religious message from the argument that evolution promoted the development of altruism, the willingness to sacrifice one's own interests for those of others (Moore 1985b). Thus, God could be seen as the Creator of a process designed to promote moral values, even if the early stages relied on harsher instincts which ultimately had to be transcended. By the early

years of the new century, a concerted effort had emerged to create a new natural theology based on evolutionism (Durant 1985).

In the Anglican Church, the movement known as Modernism promoted this effort to forge a reconciliation with science. This was not, of course, the modernism of the artistic and philosophical avant-garde—it was based firmly on the progressionist viewpoint established in previous decades, and increasingly it depended on the older generation of biologists for its scientific credibility (Bowler 2001). Conwy Lloyd Morgan's emergent evolutionism was typical of the kind of scientific writing which appealed to liberal religious thinkers. Some if its supporters, including the Anglican Modernist Charles Raven, still openly supported non-Darwinian theories such as Lamarckism (Raven's 1942 biography of the seventeenth-century naturalist John Ray was a product of his campaign to restore natural theology). Others, such as Bishop E. W. Barnes, were aware that biology was moving steadily against Lamarckism, but still were anxious to preserve the progressionist viewpoint. In the 1920s Barnes was notorious for preaching "gorilla sermons" in which he insisted that the evolutionary viewpoint required a rejection of the old notion of original sin (Bowler 1998). As a mathematics don at Cambridge, Barnes had taught R. A. Fisher, and he could see how Fisher was creating a new Darwinism based on the genetical theory of natural selection. Fisher himself was an Anglican, but as yet few were willing to follow his claim that natural selection was the kind of creative force a Christian could endorse.

The problem with the Modernist position was that it presented humankind as the agent of progressive evolution, ignoring the traditional Christian belief that we are fallen creatures. Original sin was no more than the awakening of the moral sense in our apelike ancestors. The Modernist position was, in fact, very close to that presented by some explicitly non-Christian thinkers such as George Bernard Shaw and Julian Huxley (J. Greene 1990). Conservative Christians, both evangelical and Catholic, were concerned that the liberals, in their efforts to create a religion that would be credible to evolutionists, had abandoned the fundamental teachings of their religion. The conservatives realized that evolution was widely perceived as a component of the rationalist campaign against organized religion. It was thus necessary to challenge evolutionism, at least as an account of the origin of the human soul. In Britain, popular Roman Catholic writers such as Hilaire Belloc and G. K. Chesterton were the most effective opponents of evolutionism, Belloc being particularly active in challenging rationalists such as H. G. Wells (Bowler 2001). The Catholic Church had hardened its attitude against evolutionism at the turn of the century, thanks in part to

the influence of a conservative group of Jesuits in Rome (Brundell 2001). This position soon softened on the question of the evolution of the physical body, as writers such as Henri de Dorlodot (1925) and Ernest Messenger (1931) pointed out—as Mivart had noted earlier—that the church fathers did not interpret Genesis literally on this issue. The Church has, however, remained opposed to the idea that the soul could have emerged from an animal mentality.

In late-nineteenth-century America, there were also many liberal Protestants prepared to endorse evolutionism as the unfolding of God's plan (Livingstone 1987; Moore 1979, 1985a; J. Roberts 1988; for a collection of primary sources, see Ryan 2002). Spencer's influential philosophy showed that evolution promoted the traditional values of the Protestant work ethic. This tradition was presumably carried into the twentieth century, although historians have been remarkably slow to explore its influence. Instead, all attention turned to the form of Protestant fundamentalism which emerged as the flagship for opposition to evolutionism. The most visible symbol of this campaign was the "monkey trial" of John Thomas Scopes in Dayton, Tennessee, in 1925. In response to mounting concerns that evolutionism was undermining traditional Christianity, Tennessee had passed the Butler Act forbidding the teaching of the subject in its public schools. Scopes deliberately violated the act and was prosecuted in a high-profile trial. The fundamentalist politician William Jennings Bryan led the prosecution, and the agnostic lawyer Clarence Darrow the defense. The trial has gone down in history as a watershed in the modern relationship between science and religion, resulting in a plethora of books (e.g., De Camp 1968; Ginger 1958; Scopes 1967; Settle 1972) and a play (subsequently twice filmed), *Inherit the Wind*. Yet modern historians have challenged most of the myths surrounding this celebrated trial. Not all fundamentalists were opponents of evolution, and the conservative theological position concealed a wide range of differing positions (E. Larson 1998; Livingstone 1987; Numbers 1992, 1998; for primary sources, see Numbers 1994–95). Not all southern states followed Tennessee in banning the teaching of evolution, nor was the Scopes trial the high point of the movement's influence. And although the popular myth has the opponents triumphing over the discredited fundamentalists, the latter's campaign was remarkable effective in keeping evolutionism out of high school textbooks over the next several decades (Grabiner and Miller 1974). A later, and still active, wave of opposition to evolutionism emerged in reaction to a renewed onslaught by the evolutionists in the 1950s and 1960s, following the consolidation of the modern Darwinian synthesis.