The Darwinian Context: Evolution and Inheritance

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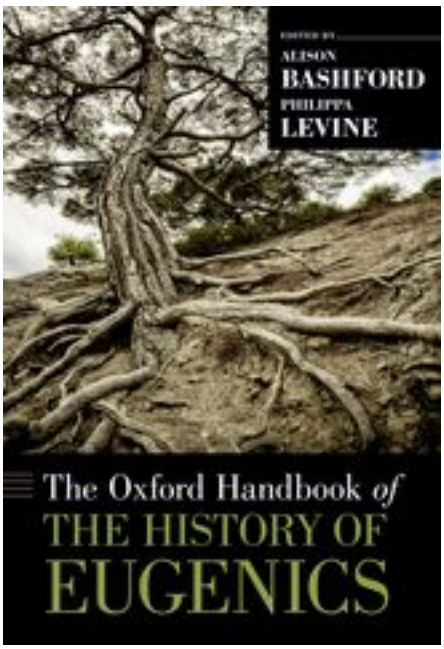

WHETHER efforts to improve the human stock follow logically from Charles Darwin's theory of evolution is a contested and highly sensitive issue. In recent years, defenders of creationism have taken to charging Darwin and his theory with responsibility not just for the rise of eugenics, but for that movement's absolutely worst barbarities. Thus, according to AnswersinGenesis.com, a Web site linked to the recently established Creation Museum in Petersburg, Kentucky:

> Firmly convinced that Darwinian evolution was true, Hitler saw himself as the modern saviour of mankind. . . . By breeding a superior race, the world would look upon him as the man who pulled humanity up to a higher level of evolutionary development. If Darwinism is true, Hitler was our saviour and we have crucified him. As a result, the human race will grievously suffer. If Darwinism is not true, what Hitler attempted to do must be ranked with the most heinous crimes of

history and Darwin as the father of one of the most destructive philosophies of history.[1]

Strong stuff. No wonder feelings run high. But with the “eugenics” label deployed as a weapon of war against evolution, sometimes crudely, sometimes cleverly, the temptation to take no prisoners besets both sides. Those anxious to defend Darwin acknowledge that eugenicists often invoked his theory but condemn them for perverting its intent and substance. In their counter-framing of history, Darwin himself would have been appalled to find others drawing social implications from his strictly scientific work.

(p. 28) As often occurs when the past is used by partisans, historical nuance is lost. These dueling accounts caricature both Darwin (1809–1882) and the theory of evolution by natural selection as he and his peers conceived it. Darwin was not a proponent of eugenics, much less a proto-Nazi. Yet his theories and his own writings on social evolution, especially the 1871 *Descent of Man,* played a vital role in shaping scientific and popular attitudes on questions related to human breeding. In this chapter, we aim to show how this came about.

Implications of the *Origin of Species:* Francis Galton

Anxieties about Darwin's theory of evolution by natural selection explain why it was not until the late nineteenth century that a concept endorsed by Plato and Aristotle helped underwrite a social movement. Although Darwin avoided discussing “man” in the *Origin of Species,* there was widespread unease about the book's human implications. Controversy immediately centered on the “monkey question”: Were humans descended from apes and, if so, what were the implications for morality and society? If humans had reached their current high estate through a process in which the weak in mind and body were constantly eliminated through natural selection, weren't public charities, vaccinations, sanitary measures and the like counterproductive? Didn't they allow the less adequate members of society to survive and reproduce? Wouldn't these people eventually swamp the more capable and thus reverse the direction of evolution? And if progress were threatened, what could and should be done to maintain it? Withdraw aid to the mentally and physically weak? Continue to salvage the sickly but discourage or prevent them from reproducing? Encourage the capable to marry early and produce many children?

Such questions vexed Darwin and many of his contemporaries, such as the retired mill owner William Rathbone Greg (1809–1881), who argued that natural selection was failing in the case of humans and that in a sensible world, only those who passed a competitive examination would be allowed to breed.[2] But the first to publicize unease about the

relaxation of selection in “civilized societies” was Darwin's half first cousin, Francis Galton (1822–1911).[3] His intervention was also the most influential, not least because of its impact on Darwin.

In his memoirs, Galton recalled that the *Origin* had extinguished his Christian beliefs like a nightmare exposed to the light of day and had aroused in him “a spirit of rebellion against all ancient authorities whose positive and unauthenticated statements were contradicted by modern science.” Darwin inspired Galton to pursue a long-standing interest in the topics of heredity “and the possible improvement of the Human Race.”[4] The first fruits of his research were two articles entitled (p. 29) “Hereditary Talent and Character.”[5] Published in 1865 in a highly respectable monthly aimed at an upper-middle-class audience, the article argued that the laws of inheritance applied to humans just as much as they did to other animals, and that mental and temperamental as well as physical traits were inherited from both parents. Galton also proposed that human mentality and character could be improved through institutionalized good breeding. Four years later, Galton expanded the argument into a book, *Hereditary Genius.*[6]

The ideas Galton advanced in the 1860s hardly arose *de novo* with him. As John Waller has argued, the common view of Galton as the founder of eugenics has led to a neglect of an earlier discourse on the transmission of hereditary disease and its reproductive implications.[7] The science of phrenology, which related the shape of the skull to specific human propensities such as friendship, compassion, and envy, was also an element in this context. Phrenology's founder, Franz Joseph Gall (1758–1828), argued that intellectual and moral faculties were innate; the work of Gall and his successors was held in high respect by some quite eminent Victorians.[8]

The practical implications of these doctrines had also been much debated. In the 1840s, the relative importance of “innate character” and “institutional arrangements” in explaining human differences was central to bitter disputes over the “Irish problem” and the status of black labor in Jamaica. The philosopher and economist John Stuart Mill (1806–1873) took the lead in arguing that human behavior and social relationships were the product of history and culture and so were malleable, while his nemesis Thomas Carlyle (1795–1881) insisted that they were fixed by nature.[9] Mill's famous assertion, “Of all the vulgar modes of escaping from the consideration of the social and moral influences on the human mind, the most vulgar is that of attributing the diversities of conduct and character to inherent natural differences,” appeared in the first edition of his *Principles of Political Economy,* published in 1848 long before Galton's article and Darwin's *Origin.*[10]

That a debate had already begun does not reduce the importance of Galton. His intervention was the first framing of the issue to be inspired by the *Origin:* the first to make an *evolutionary* argument about human nature and to link questions of human breeding to the anxieties about biological decline that Darwin had provoked. Galton also advanced for the first time a “hard” concept of heredity, repudiating the conventional “soft” or Lamarckian belief in the inheritance of acquired characters. And he embarked on the first systematic empirical inquiry into inheritance, with statistical studies that

proved convincing to some prominent contemporaries, not all of whom shared his political inclinations. A favorable review of *Hereditary Genius* by Alfred Russel Wallace (1823–1913), an Owenite socialist, was only the beginning of his support for Galton's project. Although Wallace could be a severe critic of eugenics, he always showed the greatest respect for Galton's empirical work, which convinced him that both individual and national differences are in large part hereditary and that in respect to innate quality, modern Britons compared poorly with ancient Athenians.[11] Of Galton's project, Ruth Schwartz Cowan has noted that “rarely in the history of science has such an important generalization (p. 30) been made on the basis of so little concrete evidence, so badly put, and so naively conceived.”[12] But several prominent scientists among his contemporaries thought Galton entirely plausible.

What was Galton's case? He began by acknowledging that little was known of the laws of inheritance. However, he argued, we need not understand exactly *how* traits are inherited to recognize that in humans, as in other animals, offspring tend to resemble their parents both mentally and physically. To establish this, Galton used biographical reference works to show that scientists, statesmen, artists, and others “eminent” enough to be listed were more likely than the general population to have close male relatives also eminent enough to be listed. From this apparent fact that high achievement runs in families, Galton concluded that the traits making for success were transmitted from parent to child in the hereditary material: all human qualities and faculties, physical, moral, mental, and religious, were essentially fixed at birth and that when people succeeded in life it was because they had inherited the necessary traits, and that when they failed, it was because they had not.

Making eminence a fair test of natural ability was controversial, as Galton well knew. Thus he sought to minimize other causes of professional success, such as education and family connections. Against the presumed skeptics, he asserted that, in general, the truly gifted would succeed in life however impoverished their environment, while those who lacked ability (a combination of intelligence, energy, and perseverance) would fail, however favorable their education and training or influential their social connections. Or at least these results would hold in the fields Galton considered meritocracies, such as science and the law.

Having made his case for the inheritance of ability, Galton went on to argue that the least capable members of society were reproducing too rapidly. Darwin had shown that progress depended on a struggle in which the fittest survived and reproduced. It now seemed as though this process was being halted. Civilized societies restrained the natural culling process, allowing those to survive and reproduce who in earlier ages would have succumbed to starvation, cold, or disease. Meanwhile, the most gifted individuals were producing fewer offspring. Unless these trends were reversed, the quality of civilized populations would continue to decline. Galton told Darwin that he feared natural selection was spoiling rather than improving the human race because “it is the classes of

coarser organisation who seem on the whole most favoured…and who survive to become the parents of the next [generation]."[13]

Hereditary Genius included a chapter analyzing the comparative worth of different races. By estimating the proportion of eminent men in each race, Galton calculated that black Africans ranked on average two grades below whites in natural ability, and Australian Aborigines three. The ablest race in history was the ancient Greeks, especially the Athenians. But the high "Athenian breed" declined and eventually disappeared because emigration and immigration weakened the race and the most gifted Athenian women failed to marry and reproduce.[14]

(p. 31) Galton did not consider the "savage" races to be a threat.[15] He assumed that the stronger would eventually extirpate the weaker in a process that was already well advanced. The fate of Anglo-Saxons was another matter: Galton believed his own race was following the Athenians by failing to breed from the best; degeneration would render the English unfit to cope with the demands of an increasingly complex world.

What to do about it? Galton proposed that humans should deliberately take charge of their own evolution, doing for themselves what breeders did for domestic plants and animals. This was what Galton would later call "positive" eugenics—increasing the proportion of individuals with desirable traits. ("Negative" eugenics decreased the proportion of those with undesirable traits.) The most pressing task for Galton was to enrich society with outstanding individuals. And he thought the best way to achieve this was to induce the sort of men celebrated in *Hereditary Genius* to marry similarly gifted women. Eventually, their intermarried dynasties, isolated from the main population, would constitute a new human breed. "[B]y selecting men and women of rare and similar talent, and mating them together, generation after generation, an extraordinarily gifted race might be developed," he predicted.[16] The superiority of this race would become evident as natural selection culled its competitors. As proof, Galton pointed to the United States, where the most extraordinary Europeans had been selectively isolated for generations and were now breeding at the expense of the inferior indigenous races.

In his 1865 article, Galton imagined a Utopia where marriages among those receiving the highest marks in state-administered competitive exams were celebrated at Westminster Abbey and rewarded with wedding presents generous enough to allow them to start a family immediately. If only 5 percent of what was spent to improve breeds of horses and cattle were expended on measures to enhance the human race, he mused, "what a galaxy of genius might we not create!"[17] It was less clear what might be done in the here-and-now. In the 1860s, Galton made his breeding schemes conditional on inheritance in humans being as well understood as it was in domestic animals.

Later, Galton floated other ideas for inducing "fit" people to have more children: competitions for state "dowries" to encourage early marriage; subsidized housing "settlements" where gifted couples could raise large families; and even eugenic farms. Rich landowners on "liberally-managed" estates could take in promising young people, gathering "fine specimens of humanity" around them in the same way they "procure and

maintain fine breeds of cattle." The youths would then naturally "marry early and suitably" among themselves, and secure "favour for their subsequent offspring"—the first-fruit of human husbandry.[18] In 1890, Galton proposed to Henry Sidgwick (1838–1900), the cofounder of Newnham College, that Cambridge University women of superior health and intellect should receive £50 if they married before age 26 and £25 on the birth of each child: "It is a monstrous shame to use any of these gifted girls for hack work, such as bread winning…as bad as using up the winners of the Oaks in harness work."[19]

(p. 32) From *Hereditary Genius* to *The Descent of Man*

While reading *Hereditary Genius,* Darwin wrote to congratulate his cousin: "I must exhale myself, else something will go wrong in my inside. I do not think I ever in all my life read anything more interesting and original."[20] He agreed with "every word" in Wallace's favorable review and, for all their differences, told him so.[21] Darwin's high opinion of the book and preceding articles is perhaps most evident from his frequent citations in *The Descent of Man.*

What did he so admire in Galton's work and how did he deploy its arguments? Darwin would surely have felt flattered by Galton's chapter on scientific men, in which the Darwin family loomed large, and there were more substantive reasons why Galton's claims about the inheritance of talent and character must have appealed to him. Darwin's theory rested on the assumption of heritable variations for morphological, physiological, and behavioral traits. Those heritable differences constituted "the raw material from which natural selection would choose its winners and losers."[22] Galton's work rested on the same assumption.

Despite Darwin's claim that his cousin partly converted him to natural ability rather than "zeal and hard work" as the root of genius, he may have already been convinced of that.[23] In any case, the *Descent* maintains that most human traits are innate. Mental characters are inherited in domestic animals and in families alike; and "we now know through the admirable labours of Mr. Galton that genius…tends to be inherited; and on the other hand, it is too certain that insanity and deteriorated mental powers likewise run in the same families."[24] In his autobiography Darwin was "inclined to agree with Francis Galton…that education and environment produce only a small effect on the mind of any one, and that most of our qualities are innate."[25] Thus he criticized John Stuart Mill for believing that education and environment powerfully shape human nature. He may have admired Mill's intellect and at least sometimes his politics, but he took issue in the *Descent* with Mill's environmentalism, and in the second edition even added a note: "The ignoring of all transmitted mental qualities will, as it seems to me, be hereafter judged as a most serious blemish in the works of Mr. Mill."[26]

If human qualities are innate, they must be both the product of natural selection and subject to its continuing action: “Man, like every other animal, has no doubt advanced to his present high condition through a struggle for existence consequent on his rapid multiplication; and if he is to advance still higher, it is to be feared that he must remain subject to a severe struggle.”[27] Given that selection follows from the struggle for existence, what are the likely consequences of mitigating that struggle? In his chapter on “civilized nations,” Darwin tried to account for the social world of his day, its character, development, and future progress, in the light of natural selection. What he saw was the individually and racially fittest being swamped by the less fit. The phrases he used to refer to the former include: “the able (p. 33) in body and mind,” “the finest young men,” “the intellectually superior,” “civilised races,” “the frugal, foreseeing, self-respecting, ambitious Scot,” “the English,” “Canadians of English…extraction,” and “Anglo-Saxon people.” The less fit are characterized as the “shorter and feebler men, with poor constitutions,” “melancholic and insane persons,” “violent and quarrelsome men,” “profligate women,” “parents who are short-lived,” “the reckless and improvident,” “the vicious and otherwise inferior members of society,” “the poorest classes,” “Celts,” “Canadians of…French extraction,” and “the careless, squalid, unaspiring Irishman.”

It seemed to Darwin that the less fit were reproductively more successful than the rest. The prudent waited to marry until they could afford to raise children; the improvident married young and had many children born during their mothers' prime of life to inherit strong constitutions. The less fit also survived because civilized societies actively checked the struggle for existence, building asylums for the sick, imbecile, and insane, vaccinating against smallpox, and in other ways preserving the weak. Darwin attributed success in domestic-animal breeding to the “elimination of those individuals…which are in any marked manner inferior.” Blackness in sheep was as undesirable as “black sheep” in a family, “men” whose bad dispositions “may perhaps be reversions to a savage state.” “Hardly anyone is so ignorant as to allow his worst animals to breed,” yet civilized people permit the “weak members” of their societies to “propagate their kind.” This “must be highly injurious to the race.” Except, no (Darwin balked), to do otherwise would have a worse effect, eroding “the noblest part of our nature,” the moral sentiments, which have themselves evolved.[28]

Here Darwin vacillated and hesitated. He sometimes wrote as though the need for social intervention was urgent. Thus he remarked that if various checks “do not prevent the reckless, the vicious, and the otherwise inferior members of society from increasing at a quicker rate than the better class of men, the nation will retrograde, as has occurred too often in the history of the world.”[29] Yet he also thought selection continued to work in a positive direction. Mortality was high among the feckless poor and among irresponsible women who married very young. Criminals and the insane died disproportionately often by their own or others' hands; imbeciles and others in institutions were kept from reproducing. Profligate men and women frequently became infertile from disease, while the incurably restless tended to emigrate. Even among the very poor, the more intelligent

and thrifty had some edge over their “stupid” and “restless” fellows and so tended to leave more offspring.

In the *Descent's* concluding pages, Darwin comes as close as he ever would to stating how humans could improve themselves by selective breeding. Selection, he wrote, might enhance man's body, intellect, and morals, and the sort he recommended was purely voluntary and individualistic: abstinence from marriage. Beyond this, all hopes for bettering humanity were “Utopian and will never be even partially realised until the laws of inheritance are thoroughly known.” The crucial word here is “until.” Darwin did *not*—nor did he ever—rule out a society (Utopian or otherwise) in which the artificial selection of humans would be *other* than (p. 34) voluntary and individualistic. This is evident from his slap at Parliament for rejecting a proposal—his own in fact—to shed light on at least one law of inheritance: “whether or not consanguineous marriages are injurious to man.”[30] Had such a law been discovered, Darwin would surely have wished legislation to be guided by it: his own sick children were the offspring of a first-cousin marriage.

Laws of Inheritance

Both Darwin and Galton realized that efforts to improve human populations through breeding were limited by ignorance of the laws of inheritance. But as each worked intently to understand those laws, their perspectives increasingly diverged.

Darwin knew a great deal about the mechanics of reproduction. It could even be said that he was obsessed with the subject. But the *results* of sex baffled him. Why do offspring differ from their parents? Why do they resemble one parent more than the other, or resemble grandparents or more distant relatives, or occasionally resemble no one in the family? Why do defects and monstrosities occur? To all such questions, each edition of the *Origin of Species* solemnly replied: “No one can say.”[31]

He did have certain fundamental beliefs about inheritance. After all, he had studied the subject all of his life and probably knew as much about its *phenomena*—what the unknown “laws of inheritance” had to explain—as any living person. He read the great treatises on heredity, tapped breeders' lore, solicited facts from around the world, and undertook his own observations and experiments. In the course of these investigations, he developed ideas about how the baffling phenomena were produced. One premise of everything Darwin believed about inheritance was that characters acquired during an organism's lifetime could be transmitted to their offspring. These included the effects of habit and “use and disuse” of organs, and to some extent the direct effects of the environment. In this sense, Darwin was a lifelong Lamarckian, though he still believed that natural selection was, on the whole, the most potent cause of evolution.

But Lamarckian inheritance lacked a mechanism. In The Variation of Animals and Plants under Domestication (1868) and again in *The Descent of Man,* Darwin sought to supply one in his “provisional hypothesis of pangenesis,” a plausible speculation to account for the appearance of individual variations, the phenomena of atavism (the reappearance of characters of distant relatives), the intermediate nature of hybrids, and the non-inheritance of characters in offspring.

According to the hypothesis, cells in the body throw off minute copies of themselves. These “gemmules” circulate throughout the body, collect in the reproductive organs, and mix with the gemmules of another organism during fertilization. Darwin compared the gemmules to seeds in a “bed of mould,” noting that some will germinate quickly, others not at all, and that some will lie dormant for a period, appearing later in life or in a future generation. “When we hear it said that a man (p. 35) carries in his constitution the seeds of an inherited disease, there is much literal truth in the expression.”[32] Only some mechanism such as pangenesis could explain how changed conditions of life or the long-continued use and disuse of bodily organs produced inherited modifications.

It is crucial, from this perspective, that parents were able to increase the biological as well as the social endowment they bequeathed to their children. Whatever their social assets, a family could, to an extent, enhance their biological fortunes through education, exercise, good nourishment, and the pursuit of “higher” pleasures such as music and art. Good gemmules, like precious gems, could be amassed and bequeathed to posterity by parents who led prudent lives. The same principle applied to society. Improved social conditions could, at least in some circumstances, benefit future generations by improving people's bodies and thus the gemmules they pass on. So in Darwin and Galton's day, a “hereditarian” position was not necessarily pessimistic. Even if pauperism, criminality, and other undesirable behaviors were attributable to bad heredity, they could in principle be ameliorated through environmental improvements. In this way, Lamarckian heredity seemed to bolster the case for correcting unhealthy habits and conditions. Although some Lamarckians argued that deterioration continued for several generations would become, for all practical purposes, irreversible, their “soft” view of heredity was generally associated with an optimistic and socially reformist spirit.

But what if acquired characters were *not* inherited? What if one's best efforts to live well did not benefit one's offspring? What if their biological endowment had little or nothing to do with parental investment? What if improvements in social conditions had no direct effect on the hereditary quality of a population? This was the prospect raised by Galton. The consequences he foresaw were radically far-reaching.

In his article “Hereditary Talent and Character” Galton grasped the nettle firmly: “Can we hand anything down to our children, that we have fairly won by our own independent exertions?…Or are we no more than passive transmitters of a nature we have received, and which we have no power to modify?” In short, are acquired characters inherited? Galton thought not; or at least the inherited effect was minimal. Individual variations arose “we know not how”; “moral monstrosities” were born, not made. Social influences

altered inborn dispositions only through selection. Thus generations of European misfits were selected, or selected themselves, to emigrate to America, and from their "exceedingly varied, and usually extreme" inborn dispositions, a nation of roughnecks had been born, "restless…enterprising, defiant, and touchy…very tolerant of fraud and violence…strongly addicted to cant."[33]

While studying Darwin's *Variation of Animals and Plants,* Galton saw how the pangenesis hypothesis could be tested. He took Darwin's statement that the gemmules "circulate freely throughout the system" to mean they were carried in the bloodstream to the sex organs. If this was right, Galton reasoned, it should be possible to transfuse blood between animals and give the recipients' progeny the qualities of the donors. In consultation with Darwin, Galton embarked on a series of experiments with rabbits, transfusing silver-greys with blood from other strains. The male and female silver-greys were then mated. Two years and many litters later, (p. 36) Galton had found no evidence of transmitted characters in the transfused blood, and in March 1871, he reported his negative results to the Royal Society.[34]

Galton believed he had refuted the pangenesis hypothesis. The distinction *between* inheritance *and* acquired characters hardened in his mind, and he began to tackle the social implications. With artificial selection now the sole remaining means of heritable human improvement, society had to aim to "breed out feeble constitutions, and petty and ignoble instincts, and to breed in those which are vigorous and noble and social." Individuals should submit themselves "like bees or ants" to this collective task. "I do not for a moment contemplate coercion," Galton added, anticipating political flak, but he did let slip that it was "easy to believe the time may come" when those who persistently "procreate children, inferior in moral, intellectual and physical qualities…would be considered as enemies to the State, and to have forfeited all claims to kindness." Meanwhile, to promote good breeding, science would have to be mobilized. "Some society" was needed to advise the state, a body that would study breeding in a "purely scientific" way.[35]

What was the proposed society's field of work to be called? "We greatly want a brief word to express the science of improving stock," Galton wrote in 1883. "The word *eugenics* would sufficiently express the idea." Eugenics, he explained, from Greek, meaning "good in stock, hereditarily endowed with noble qualities," was "equally applicable to men, brutes, and plants," though he regretted that breeding in all these branches was as yet unequally understood. "Investigation of human eugenics…is at present extremely hampered by the want of full family histories, both medical and general, extending over three or four generations. There was no such difficulty in investigating animal eugenics," which benefited from stud books and the like. But once human breeding was as well understood as that of animals—once the human equivalent of a national stud book had been established—the state could begin to act. Of all eugenic policies, "the most merciful…would consist in watching for the indications of superior strains or races, and in favouring them that their progeny shall outnumber and gradually replace that of the old one." To cooperate thus for Great—and a greater—Britain's sake, or indeed to submit

one's family tree to pruning, would be a new form of religious obligation. Eugenics to Galton was the ethical heart and soul of a Church Scientific, with cousin Charles as its patron saint. Man's duty henceforth would be to “further evolution” through good breeding.[36]

Troubled Times

Hereditary Genius had a tepid reception.[37] Although it impressed Darwin, Wallace, and a few other men of science, reviewers in political, literary, and theological journals were unenthusiastic and the book sold poorly. Given the number of conventional beliefs it challenged, that was not surprising. Galton, anti-clerical and openly skeptical of religious doctrines, explained religious sentiment by natural selection, (p. 37) denied the soul's existence, and belittled the doctrine of Original Sin. Flawed human nature was not the result of Adam's Fall but a biological inheritance from animal ancestors, the product of an unfinished evolution. Man's immediate ancestors were barbarians, fitted by natural selection to their conditions of life; and selection had not caught up with the requirements of a civilized state. Accordingly, moral struggle was futile. Galton had little patience with “tales written to teach children to be good—that babies are born pretty much alike and that the sole agencies in creating differences between boy and boy, and man and man, are steady application and moral effort.”[38] Virtue and vice were fixed in men by nature and ultimately beyond individual control. Moral responsibility was not to be inculcated but in-bred.

Galton's audacity was breathtaking. He stood all but alone, lacking a scientific consensus to support his biological premises. Natural selection had few adherents, and many converts to evolution, still accepting Lamarckian inheritance, doubted selection's sufficiency. Worse, Galton had little basis for applying selection to humans. He lacked data on the inheritance of mental and moral traits for *any* population, and his pedigree research was restricted to eminent families. Given the prevailing assumption of “soft” heredity, social reform was viewed as a plausible solution even to admitted hereditary problems. Galton's claim that the mentally and morally worst were swamping the best was based on theoretical considerations, not thorough research. Thus his work was initially greeted with skepticism.

But thirty years later the new science caught on. Galton bankrolled the Eugenics Record Office at University College in 1904 and transformed it under his disciple Karl Pearson (1857–1936) in 1907 into the Francis Galton Laboratory for the Study of National Eugenics. For decades, Galton had sought to capture the nation's interest in breeding by publishing articles about “trotting horses,” “pedigree moths,” and “three generations of lunatic cats.” He had even perfected fingerprinting as a method of identifying criminals (his most famous legacy), and now in his eighties, he finally realized his pet project, a society for promoting eugenics.[39]

By the first decade of the twentieth century, Galton's “hard” view of heredity had been reinforced by the German cytologist August Weismann's research on the cell nucleus. In 1883, Weismann (1834–1914) identified two distinct cell types: germ cells, present in the gonads, which give rise to sperm and eggs; and somatic cells, present in all other bodily tissues. He went further: germ cells were completely isolated from somatic cells. Although the latter could be affected by the environment, the hereditary units in the former were inviolate and transmitted unaltered down the generations. Hard though parents might strive to improve their minds or bodies, their children would reap no benefit; and no environmental tinkering would improve the hereditary endowment of populations. Weismann himself concluded that the only route to race improvement lay in selective breeding. His doctrines did not immediately sweep the field, but they found many more immediate adherents than Galton's had at first.

While Weismann and Galton laid the theoretical groundwork for eugenics, a raft of statistical studies seemed to demonstrate national decline in Britain.[40] Galton (like Darwin) had expressed dismay at the fecundity of the poor, but he had data for only a select and narrow slice of society. By the turn of the century, alarmist fears (p. 38) about degeneration seemed amply confirmed. The end of the Boer War (1899–1902) was followed by shocking reports of the number of recruits deemed unfit for military service, which raised the question of whether hereditary weakness would not fatally undermine Britain's capacity for exercising imperial power.[41] Meanwhile, demographic studies demonstrated an inverse correlation between fertility and socioeconomic status, with the birthrate apparently falling much more sharply among the middle and upper-middle classes than among workers and agricultural laborers.[42] Now the old problem of the “differential birthrate” became shockingly real. If the wretched poor were wretched by nature, a nature that was fixed, their apparent high fertility seemed to justify the gloomiest of Darwin's predictions and demand urgent action.

Galton used the new evidence to dramatic effect in his 1901 Huxley Lecture to the Anthropological Institute in London, “The Possible Improvement of the Human Breed, under the Existing Conditions of Law and Sentiment.” The tone and content contrasted sharply with Galton's 1865 articles. By 1901, Galton had available some of Charles Booth's 17-volume survey, Life and Labour of the People in London (1889–1903), with its statistical evidence for the class divisions of London society.[43] Galton manipulated the data, quietly generalizing it to the whole country *and* subdividing the nation's classes into the “same proportions” found in “East London,” stating that though “certainly not accurate,” the results were “probably not far wrong.”[44] As the East End's social structure was then even less typical of Britain's than it is today, we may surmise that Galton viewed the nation through a badly distorting lens, the population appearing to him more like Jack London's outcast People of the Abyss (1903) than a fair use of the evidence would warrant.[45] But the point is: there *was* evidence now, however questionable, which—on the basis of increasingly shared assumptions about evolution and heredity—pointed to a troubled future.

Galton in 1865 had tabled an uplifting spiritual agenda, the epitome of high Victorian optimism. How different he sounded in 1901! The Huxley lecture ended in a bright haze —“we plant our stock all over the world”—but in general the tone was dark. Galton played up the threat from Booth's lowest class, the hereditary “barbarians,” whom he says it would be “an economy and a great benefit to the country” to segregate “under merciful surveillance,” and deny “opportunities for producing offspring.” Eugenics was no longer just about breeding *from* the right people, though this remained his chief concern; it was also about identifying those who ought *not* to breed. Both sort of eugenics—positive and negative—Galton believed “raise the average, the latter by reducing the undesirables, the former by increasing those who will become the lights of the nation.”[46]

One who agreed wholeheartedly, and more, was Karl Pearson. Appointed the first Galton Professor of Eugenics at University College London, thanks to a £45,000 bequest in Galton's will, he shared his mentor's belief in hard heredity and fascination with statistics. Pearson may have been a social and political radical, but his militaristic and imperialist eugenics was much harsher than Galton's, and even more strongly inflected by racism.

(p. 39) In his well-known 1901 lecture “National Life from the Standpoint of Science,” Pearson argued that it was not the individual but “the herd, the tribe, or the nation which forms the fundamental unit in the evolution of man.” Evolution is driven by a global struggle among such units for living space and raw materials. Superior and inferior races cannot coexist; if the former are to make effective use of global resources, the latter must be extirpated. To keep the nation to “a high pitch of internal efficiency,” its members should be replenished from the best stock; to maintain external efficiency, the nation must beat inferiors and fight equals for trade routes and resources. Pearson ended the lecture on a bleak note indeed: “Mankind…advances through pain and suffering only. The path of progress is strewn with the wreck of nations; traces are everywhere to be seen of the hectacombs of inferior races, and of victims who found not the narrow way to the greater perfection.”[47] As the twentieth century wore on, these dark motifs became increasingly prominent among eugenicists worldwide.

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(p. 42) Gayon, Jean. *Darwinism's Struggle for Survival: Heredity and the Hypothesis of Natural Selection* (Cambridge: Cambridge University Press, 2007).

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Notes:

(1.) J. Bergman, "Darwinism and the Nazi Race Holocaust," *Technical Journal* 13 (1999): 101–111, www.answersingenesis.org/tj/v13/i2/nazi.asp (accessed 15 April 2008).

(2.) William Greg, "On the Failure of 'Natural Selection' in the Case of Man," *Fraser's Magazine* 68 (1868): 353–362.

(3.) Galton's mother was a Darwin, the first daughter of Charles Darwin's grandfather's second marriage, which made Francis and Charles half first-cousins.

(4.) Francis Galton, *Memories of My Life* (London: Methuen, 1908), 298.

(5.) Francis Galton, "Hereditary Talent and Character," *Macmillan's Magazine* 12 (1865): 157–166, 318–327.

(6.) Francis Galton, *Hereditary Genius: An Inquiry into Its Laws and Consequences* (London: Macmillan, 1869).

(7.) John C. Waller, "Ideas of Heredity, Reproduction and Eugenics in Britain, 1800–1875," *Studies in History and Philosophy of Biological and Biomedical Sciences* 32, no. 3 (2001): 458, 463.

(8.) Franz Joseph Gall, *On the Function of the Brain and of Each of Its Parts: With Observations on the Possibility of Determining the Instincts, Propensities, and Talents, or the Moral and Intellectual Dispositions of Men and Animals, by the Configuration of the Brain and Head* (Boston, MA: Marsh, Capen & Lyon, 1835); Franz Joseph Gall and Johann

Gaspar Spurzheim, *Anatomie et physiologie du système nerveux en général et du cerveau en particulier; avec des observations sur la possibilité de reconnaître plusieurs dispositions intellectuelles et morales de l'homme et des animaux par la configuration de leur têtes,* 4 vols. and atlas (Paris: F. Schoell, 1810–1819). [Spurzheim coauthored the first two volumes; Gall was sole author of the remaining two]; George Combe, *The Constitution of Man Considered in Relation to External Objects,* 8th ed. (Edinburgh: Maclachlan, 1847).

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(10.) John Stuart Mill, "Principles of Political Economy, with Some of Their Applications to Social Philosophy," in *Collected Works of John Stuart Mill,* vols. 2–3, ed. J. M. Robson (London: John W. Parker, 1848; Toronto: University of Toronto Press, 1965).

(11.) Diane B. Paul, "Wallace, Women, and Eugenics," in *Natural Selection and Beyond: The Intellectual Legacy of Alfred Russel Wallace,* eds. Charles Smith and George Beccaloni (Oxford: Oxford University Press, 2008), 264–268.

(12.) Ruth Schwartz Cowan, "Nature and Nurture: The Interplay of Biology and Politics in the Work of Francis Galton," *Studies in the History of Biology* 1 (1977): 135.

(13.) Greta Jones, "Theoretical Foundations of Eugenics," in *Essays in the History of Eugenics,* ed. Robert A. Peel (London: The Galton Institute, 1998), 9.

(14.) Galton, *Hereditary Genius,* 331.

(15.) Nancy Stepan, *The Idea of Race in Science: Great Britain 1800–1960* (Hamden, CT: Archon Books, 1982).

(16.) Galton, "Hereditary Talent and Character," 79.

(17.) Ibid., 165.

(18.) Francis Galton, "The Possible Improvement of the Human Breed, under the Existing Conditions of Law and Sentiment," *Essays in Eugenics* (London: Eugenics Education Society, 1909), 31–32.

(19.) R. Tullberg McWilliams, *Women at Cambridge,* rev. ed (Cambridge: Cambridge University Press, 1998).

(20.) Francis Darwin and A. C. Seward, eds., *More Letters of Charles Darwin* (London: John Murray, 1903), 41.

(21.) James Marchant, *Alfred Russel Wallace: Letters and Reminiscences* (New York: Harper & Brothers, 1916), 206.

(22.) Martin Brookes, *Extreme Measures: The Dark Vision and Bright Ideas of Francis Galton* (New York and London: Bloomsbury Publishing, 2004), 171.

(23.) Galton, *Memories,* 290.

(24.) Charles R. Darwin, *The Descent of Man, and Selection in Relation to Sex,* eds. James Moore and Adrian Desmond (London: John Murray, 1871; 2nd ed., final printing 1879; London: Penguin, 2004), 46.

(25.) Charles R. Darwin, *The Autobiography of Charles Darwin, 1809–1882: With Original Omissions Restored,* ed. Nora Barlow (New York: Harcourt Brace, 1958), 43.

(26.) Darwin, *Descent,* 121, n. 5.

(27.) Ibid., 688.

(28.) Ibid., 158–169.

(29.) Ibid., 166. Wallace noted that in one of their last conversations, Darwin expressed gloomy views about the future: “in our modern civilisation natural selection had no play, and the fittest did not survive.” Alfred Russel Wallace, *My Life: A Record of Events and Opinions,* 2 vols. (London: Chapman and Hall, 1905), 2: 509.

(30.) Darwin, *Descent,* 688. The comment refers to Darwin's failed efforts to have a question on cousin-marriage included in the 1871 census.

(31.) Morse Peckham, ed., *The Origin of Species by Charles Darwin: A Variorum Text* (Philadelphia, PA: University of Pennsylvania Press, 1959).

(32.) Charles Darwin, *The Variation of Animals and Plants under Domestication,* 2 vols. (London: John Murray, 1868; rev. ed. 1875; facsmile with a new foreword by Harriet Ritvo, Baltimore, MD: Johns Hopkins University Press, 1998), 397.

(33.) Galton, “Hereditary Talent and Character,” 75–76, 77, 79.

(34.) On Galton and pangenesis, see Brookes, *Extreme Measures*, 174–177; Michael Bulmer, *Francis Galton: Pioneer of Heredity and Biometry* (Baltimore, MD: Johns Hopkins University Press, 2003), 116–118; Nicholas Wright Gilham, *A Life of Sir Francis Galton: From African Exploration to the Birth of Eugenics* (Oxford: Oxford University Press, 2001). The historian of psychology Raymond Fancher is also preparing a new Galton biography.

(35.) Francis Galton, “Hereditary Improvement,” *Fraser's Magazine,* new series, 7 (1873): 116, 120, 124, 129.

(36.) Francis Galton, *Inquiries into Human Faculty and Its Development* (London: Macmillan, 1883), 24 n5, 44, 307, 337.

(37.) Emel Aileen Gökyigit, “The Reception of Francis Galton's ‘Hereditary Genius’ in the Victorian Periodical Press,” *Journal of the History of Biology* 27 (1994): 215–240.

(38.) Galton, *Hereditary Genius,* 291.

(39.) Karl Pearson, *The Life, Letters and Labours of Francis Galton,* 3 vols. in 4 (Cambridge: Cambridge University Press, 1914–1930), 3a: 391.

(40.) Richard Soloway's factors include: *fin de siècle* soul-searching; a long agricultural and industrial depression; economic challenges from the United States and Germany; imperial rivalries in Africa and elsewhere; political ferment, including the rise of socialism; humiliating defeats in the Boer War; the declining birthrate both absolutely and relative to that of competitor nations; the differential fertility of social classes, raising fears of physical and mental deterioration and the degeneration of the “race.” Richard A. Soloway, *Demography and Degeneration: Eugenics and the Declining Birth-rate in Twentieth-Century Britain* (Chapel Hill, NC: University of North Carolina Press, 1990). Daniel Kevles mentions some of Soloway's factors in generalizing about industrialization and urbanization, the growth of big business, and mass migrations to the cities both from the countryside and abroad, which provoked racism and anti-Semitism. He adds the advent of Mendelian genetics, a spate of “social-Darwinist writings” backed up by Charles Booth's social survey, and taxpayers' resentment at the growing burden of poor relief. Daniel J. Kevles, *In the Name of Eugenics: Genetics and the Uses of Human Heredity* (Cambridge, MA: Harvard University Press, 1995), chap. 5.

(41.) Isaac Kramnick and Barry Sheerman, *Harold Laski: A Life on the Left* (New York: Penguin, 1993), 38–39.

(42.) Soloway, *Demography and Degeneration,* 10–17.

(43.) Charles Booth, *Life and Labour of the People in London,* 17 vols. (London: Macmillan, 1889–1903).

(44.) Galton, “Possible Improvement,” 8. Although not published until 1909, the lecture was given October 29, 1901.

(45.) Jack London, *The People of the Abyss* (New York: Macmillan, 1903).

(46.) Galton, “Possible Improvement,” 20–24.

(47.) Karl Pearson, *National Life from the Standpoint of Science* (London: Adam and Charles Black, 1901), 21, 43–44, 53, 61-62.

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