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The Life Sciences: "Everybody nowadays talks about evolution"

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In the first year of the third millennium, Charles Darwin replaced Charles Dickens on the British ten-pound note. He is celebrated again by the state, just as, over a century earlier, though his ideas had shocked and dismayed his contemporaries, no less than they had fascinated them, he was buried with Christian ceremony in Westminster Abbey. In 1889 the biologist and popular, prolific writer Grant Allen remarked: "everybody nowadays talks about evolution. Like electricity, the cholera germ, woman's rights, the great mining boom, and the Eastern Question, it is 'in the air'" (1889: 31). Stringing together apparently unrelated concerns of the late nineteenth century, Allen could not have chosen a more consanguineous group. Social and scientific progress, and questions of race, race failure, gender, and disease were converging under the umbrella of "evolution" (see also Chapter 2).

The politics of evolution had shifted radically over the course of the nineteenth century. In the early decades, on the edge of the hungry forties, atheistic revolutionaries were evangelizing bottom-up evolution, and the ideas of the French zoologist Jean-Baptiste de Lamarck (1744–1829) were appearing in the pauper press; the idea that an animal could transform itself into a higher being and pass on all its gains (without godly intervention) appealed to militant members of the working class. Lamarck put forward the idea of the "inheritance of acquired characteristics" or "use-inheritance" in his evolutionary treatise, *Philosophie zoologique* (1809).

This theory attempted to account for the transmutation of species, and posited that in responding to environmental changes, organisms were constantly susceptible to structural and functional changes. Each generation, in learning to cope with its environment, would transmit its learning, as acquired characteristics, to successive generations. It drew upon the materialist belief in spontaneous generation, the ascent of a scale of organization – a biological reworking of the great chain of being – and the idea of environmental influence, primarily *education*, which a number of Enlightenment thinkers had accepted in different forms. Darwin would harness the radical potential of evolution for bourgeois ends, redefining humans as material beings, and nature as a competitive free-for-all (Desmond and Moore 1992: 44). Looking back half a century in 1907, Edmund Gosse remarked in *Father and Son: A Study of Two Temperaments*:

> This was the great moment in the history of thought when the theory of the mutability of species was preparing to throw a flood of light upon all departments of human speculation and action. It was becoming necessary to stand emphatically in one army or the other . . . . The reactionaries, although never dreaming of the fate which hung over them, had not been idle. In 1857 the astounding question had for the first time been propounded with contumely, "What then, did we come from an orang-outang?" (1907: 102–3)

Robert Owen, President-elect of the British Association for the Advancement of Science, put humanity in a special sub-class, distinct from all (other) animals (1858); "I wonder what a chimpanzee would say to this?" responded Darwin (*Correspondence* 6: 419; Desmond and Moore 1992: 453). In the wake of the withdrawal of God, a new space opened for causal explanations of history, and the search for new social, political, and, now, scientific authorities, for determining forces, intensified. By the second half of the nineteenth century, the dramatic achievements of the experimental and theoretical sciences had brought a new prestige to science. Science had become a major source of military, industrial, and economic strength, and this lent it a new political status, increasing its potential as a form of social control.

Thomas Huxley concluded his review of *The Origin of Species* (1859): "we do not believe that . . . any work has appeared calculated to exert so large an influence . . . in extending the dominion of Science over regions of thought into which she has, as yet, hardly penetrated" (1864: 336). Darwin had left his readers with a cliffhanger: "In the distant future I see open fields for far more important researches. Psychology will be based on a

new foundation, that of the necessary acquirement of each mental power and capacity by gradation. Light will be thrown on the origin of man and his history" (Ch. 14). Direct light would be thrown on human origin in Darwin's *The Descent of Man, and Selection in Relation to Sex* (1871).

Biology and Sociology

There were several camps in the evolutionary debates, but the precise makeup and goals of these camps shifted during the course of the nineteenth century, as various biological and social agendas modified, concurred, and diverged. Biology is uniquely positioned among the sciences. As Heschel noted in *Who is Man*?: "A theory about the stars never becomes a part of the being of the stars . . . we become what we think of ourselves" (1965: 7). Biology is not overtly concerned with social transformation but, perhaps because it shares with other sciences a claim to enjoy a value-free objectivity, its potential to change how we perceive ourselves is even greater. Social thought before Darwin had stressed the inevitability of society and nature taking the forms they did: for example, William Paley's *Natural Theology* (1802) and the *Bridgewater Treatises* (1835) were attempts to reconcile the observations of science with what Wordsworth had termed "Nature's holy plan." By 1891, Hardy could say in *Tess of the D'Urbervilles*: "some people would like to know whence the poet whose philosophy is in these days deemed as profound and trustworthy as his song is breezy and pure, gets his authority for speaking of 'Nature's holy plan'" (Wordsworth, "Lines Written in Early Spring," 1, 22; Hardy 1891: 62).

Early in the nineteenth century Enlightenment systems of classification were called into question; the image of the tree was usurping the great chain of being. In 1836, Darwin returned from his five-year trip around the world in *HMS Beagle*, laden with material refutation of static, linear systems of classification. Natural sciences, as Foucault observes in *The Order of Things*, were replaced by social sciences as static analytical taxonomies were replaced with functional organic systems. Darwin's branching evolution undid fixity for good; with *The Origin of Species,* hierarchies became blurred and essentially problematic.

In the middle years of the nineteenth century, as the Creation Story was called into question, concern and excitement focused on alternative possibilities for the origin of humanity. "Hurrah, the Monkey Book has come," rejoiced Darwin in a letter to Huxley (Thomas Huxley Papers 5: 173) as Huxley's forthright *Evidence as to Man's Place in Nature* (1863) appeared.

But, in the decades that followed, biology became increasingly preoccupied with where humankind was *going*. This was partly because Darwin's theory of evolution was anti-teleological; it destroyed the idea of determinism. Here, barnacles played a key role; their life story refuted the idea of evolution as progress, recapitulating by a move from free-swimming larvae to sessile animals the possibility that evolution could move backwards as indifferently as forwards: life was in flux. As Huxley pointed out in 1894,

> the word "evolution", now generally applied to the cosmic process, has had a singular history, and is used in various senses. Taken in its popular signification it means progressive development, that is, gradual change from a condition of relative uniformity to one of relative complexity; but its connotation has been widened to include the phenomena of retrogressive metamorphosis, that is, of progress from a condition of relative complexity to one of relative uniformity. (6)

Like Darwin, Karl Marx explained human existence in terms of causal historical processes. At Marx's graveside in Highgate cemetery in London in 1883, Friedrich Engels said: "just as Darwin discovered the law of development of organic nature, so Marx discovered the law of development of human history" (Marx and Engels 1968: 429–30). Drawing on the Malthusian idea that population growth will inevitably outstrip food and space, Darwin defined life as struggle without a goal. Marx and Engels saw *The Origin of Species* as a "bitter satire" on man and nature; Marx remarked that "Darwin recognizes among beasts and plants his English society" (Desmond and Moore 1992: 485).

Natural selection worked toward adaptation, not progress; it was opportunistic, and ungoverned. Various thinkers grappled with the implications of the undirected nature of biological development. Wilde in *De Profundis* celebrated uncertainty – a version of Keats's "negative capability," but he could do so with a new language and backing. He embraced "the dynamic forces of life"; and "those in whom such forces become incarnate": "people whose desire is solely for self-realization never know where they are going. They can't know" (180). In 1911, in *Creative Evolution*, the French moral philosopher Henri Bergson posited a constant state of tension between the original creative life-force, the *élan vital*, and the resistance of the inert matter from which that force must construct living bodies (see Bowler 1983: 241; see also Chapter 5 in this volume); the irregular pattern of biological development, progress, even derives from this tension. Inherent in every particle of life was this rebel force.

With the new focus on what the future might hold, biology gave birth to sociology. Scratch the surfaces of sociology and biology and it soon becomes clear that both disciplines have had, from their inception, as much to do with prescription as with description. In 1853 Auguste Comte, who coined the term "sociology," wrote "the subordination of social science to biology is so evident that nobody denies it in statement, however it may be neglected in practice" (1853: II, 112). Comte held that the biological sciences were the immediate historical precursors of sociology and the logical base upon which the theories of the social sciences could be built. The organic metaphor of a functional society was a powerful catalyst for advancing the division between the sociologically normal and the pathological, a division which first appeared in the work of Comte. Comte was drawing on Claude Henri de Saint-Simon's idea that society, like the human body, had its own physiology. European sociology is grounded in analogical organicist reasoning (see D. Porter 1997: 8; T. M. Porter 1990). Herbert Spencer, sociologist and intellectual ally of George Eliot, did more than anyone to popularize the term "evolution." Integrating popular biology with social argument through analogy, he condensed laws of society and laws of physiology, and argued that life (including the life of society) was moving inevitably toward higher forms. Spencer opposed any state intervention, aggressively promoting, instead, *laissez-faire* capitalism as the social form most likely to allow each individual to exercise their powers fully in the service of the community. The pressures of competition would, he believed, ensure optimum adaptation and hence progress. For example, in "The Social Organism," he argued that "the changes going on" and "social organization in its leading peculiarities . . . are consequent on general natural causes." Responsible for the glib tautology "the survival of the fittest" (1864: ss. 164; 165), Spencer's ideas lent themselves to a biologization of racial and social hierarchies which would underpin late nineteenth-century "social Darwinism" – the selective application of Darwinian ideas to society. The spaces between Darwinism and Social Darwinism would prove fertile ground for the emergence of contradictory theories and agendas. Political groups of all persuasions had a field day, finding in Darwin's ideas justification for competition as well as cooperation. By 1904, speaking before the Sociological Society with Charles Booth, the businessman, shipowner, social investigator, and author of *Life and Labour of the People in London* (17 vols. 1889–1903), in the chair, the evolutionary biologist and sociologist Patrick Geddes would stress the importance of tapping contemporary enthusiasm for eugenics, the self-conscious control of human evolution through selective breeding (see Chapter 2 in this volume):

> Since Comte's demonstration of the necessity of the preliminary sciences to social studies, and Spencer's development of this, still more since the evolution theory has become generally recognised, no one disputes the applicability of biology to sociology. Many are, indeed, vigorously applying the conceptions of life in evolution, in geographical distribution and environment, in health and disease, to the interpretations of the problems of the times; while with the contemporary rise of eugenics to the first plane of interest, both social and scientific, these lines of thought, bio-social and biogeographic, must needs be increasingly utilised and developed. (Meller 1979: 122)

Chance

In the *Origin of Species* Darwin had introduced a radically new emphasis, grounding evolution in organic variation, placing chance at the center of the universe. Variation was central to his thesis on the origin of and preservation of species:

> owing to [the] struggle for life, any variation, however slight and from whatever cause proceeding, if it be in any degree profitable to an individual of any species, in its infinitely complex relations to other organic beings and to external nature, will tend to the preservation of that individual, and will generally be inherited by its offspring. (1859: 115)

In fact, Darwin defined natural selection as the preservation of these slight variations (1859: 115). He wrote conclusively in *Variation of Plants and Animals under Domestication:*

> no shadow of reason can be assigned for the belief that variations, alike in nature and the result of the same general laws, which have been the groundwork through natural selection of the formation of the most perfectly adapted animals in the world, man included, were intentionally and specially guided. However much we may wish it, we can hardly follow Professor Asa Gray in his belief that "variation has been led along certain beneficial lines", like a stream "along definite and useful lines of irrigation." (1868, II: 428)

The incessant construction of variety for survival is deterministic, but determined, itself, by chance.

It was the essential chanciness of nature, the randomness of life that biology revealed, that most exercised the nation, quickening the search for new sources of authority. The new disciplines of sociology and biology

were filling up the spaces opened up by Darwin's dangerous ideas. Chance is difficult to handle. Hardy's post-Darwinian poems form a sustained lament for the loss of divine agency:

> Has some Vast Imbecility, Mighty to build and blend,
> But impotent to tend,
> Framed us in jest, and left us now to hazardry?
> Or come we of an Automaton
> Unconscious of our pains?
> ("Nature's Questioning," *Wessex Poems*, 1898)

Darwin himself found it difficult to adjust to a universe without meaning, and he retained residual hopes that evolution might in the end work for the good of living beings and community: that "the vigorous, the healthy, and the happy survive and multiply" (1859: Ch. 3). Cultural narratives, even now, strive to resist the randomness of events.

> Imagine a soap opera. If Michelle from *EastEnders* sees a man going into a shop and we see her seeing him, you know that is significant. You know that in a couple of weeks he's going to nick a baby or something. I'd always thought life was like that, that somewhere along the line everything would tie in. Falling out of the window made me realize that nothing was going to tie in, there was no magical thread running through life. It's all random. But once you realize that, it's quite good. (Cocker 1998: 16)

It is unusual for chance to be left to its own devices; instead, its presence lends itself to new forms of control. As the historian Ian Hacking has argued persuasively, the autonomous laws of chance took the place of determinism during the course of the nineteenth century. The greater the level of *in*determinism, the greater the opportunities for human agency and control. There was a parallel development in human self-perception. A model of normal people replaced human nature. The word "normal" has long served for both description and evaluation, but its use to mean usual or typical emerged in the nineteenth century, in the context of physiology. The notion of the normal presents itself as a blurring of "is" and "ought" (Hacking 1990: 160–9); a huge space had opened up for new theories and forms of social control.

Galton and Huxley

The uses made of Darwin's ideas by Sir Francis Galton, his cousin, and by Thomas Huxley, his arch-popularizer (as Adrian Desmond has demonstrated so well), testify to the diverse ends to which Darwin's ideas might be applied. Galton fathered eugenics, a class-based application of evolutionary discourses which aimed to regulate population by altering the balance of class in society. For Galton, who coined the term "eugenics" in 1883, Darwin's exposition of natural, sexual, and artificial selection provided justification for human selection; he claimed that eugenics was practical Darwinism, and set out to see "what the theory of heredity, of variations and the principle of natural selection mean when applied to Man" (Pearson 1914–30, II: 86; see also Chapter 2 of this volume). Those who opposed eugenics would be able to find counter-arguments in the same theory. Darwin himself was ambivalent. In *The Descent,* drawing on ideas of "artificial selection," Darwin declared that man might:

> by selection, do something not only for the bodily constitution and frame of his offspring, but for their intellectual and moral qualities. Both sexes ought to refrain from marriage if in any marked degree inferior in body or mind; but such hopes are Utopian and will never be even partially realized until the laws of inheritance are thoroughly known. All do good service who aid towards this end. (1871: II, 403)

However, he followed the most eugenic passage in *The Descent* – "excepting in the case of man himself, hardly anyone is so ignorant as to allow his worst animals to breed" – with an emphatic refutation of eugenic principles on the grounds that "the noblest part of our nature" would be lost if 'we were intentionally to neglect the poor and helpless' (a strategy of negative eugenics) (1871: I, 168, 169). Spencer opposed any social interference with evolutionary process, while Galton believed that state intervention, such as the state regulation of marriages, through the introduction of a eugenic health certificate, would speed up "progress." The ultimate aim of both was the attainment of a future society in which the egos of individuals would merge in the interests of the whole; an idea which would become a central tenet of eugenics.

Thomas Huxley, by contrast, saw human nature, given the slowness of evolutionary change, as more or less fixed; for him, improvements were to be sought in the environment. He questioned the "unfortunate ambiguity of the phrase 'survival of the fittest,'" remarking: "I sometimes won-

der whether people, who talk so freely about extirpating the unfit, ever dispassionately consider their own history" (1894: 80).

Spencer and Galton hoped for a change in human nature; Huxley in human conditions. The camps map onto the nature–nurture divide (Galton had coined this oppositional pair of terms). The debates over the respective strengths of nature and nurture raged. Within the scientific community, the German biologist August Weismann (1834–1914) challenged Lamarckianism in the 1880s. In an experiment which involved cutting the tails off mice over a number of generations, he argued that acquired characteristics could not be inherited, for the tails returned to the mice of subsequent generations. While Lamarckians could argue that only those characteristics which were useful to the organism were inherited, the experiments did prove that mice deprived of their tails still carried the complete germ plasm for this characteristic, and that, therefore, Lamarckianism rested on a theory of soft heredity. Weismann advanced the idea of two sorts of cell, somatic, and germ cells (see Bowler 1983: 251). What was crucial about Weismann's theory was the idea that "germ plasm" was completely isolated from the body of the organism that carries it, and which it simply passes through; an organism could, under this law, only pass on to the next generation what it received from its parents. Excluding the somatic cells from any role in heredity, Weismann's theory of germ plasm effectively wrote the role of the environment out of evolutionary narrative. Hereditarian theories lend themselves to the right, and to social unfreedom, positing that people are intrinsically unequal in their inherent characteristics, and undermining the importance of environmental or social change in bringing about individual development.

The Life Sciences in Fiction

Biology was vital to nineteenth-century fiction (see Beer, Levine, Ebbatson, Greenslade, Amigoni and Wallace, Morton), and the impact of Darwin's ideas outside the scientific community was immense. George Eliot's *The Mill on the Floss*, published in 1860, the year following *The Origin*, already shows a new interest in race and fitness. As Tom Tulliver shoots peas at a bluebottle the narrator observes that nature "had provided Tom and the peas for the speedy destruction of this weak individual." Mrs. Tulliver, exercised by Maggie's general waywardness, seeks genealogical distance from her daughter, declaring that "idiocy" "niver run i' my family, thank God, no more nor a brown skin as makes her look like a mulatter," thus

linking dark skin with low intelligence. She wishes Maggie had "*our* family skin" (493, emphasis in original). Skin color signals kinship, a metonymic figuring of race. Pondering the difference between his offspring, Mr. Tulliver remarks: "that's the worst on't wi' the crossing o' breeds: you can never justly calkilate what'll come on't" (59). His words pick up on a contemporary and popular anti-evolutionary concern over the consequences of racial mix. In the words of one broadsheet writer: "As the races intermix / You can't be certain about the chicks" (Anon., *Dr. Darwin*, in Ritvo 1997: 130). Maggie's father is of darker stock than her mother, and Maggie takes after him. But Maggie's coloring serves as a metaphor both for her dissension from the accepted model of femininity, and also for her alienation from her social and natural environment. Despite the palpable presence of Darwinian ideas in her fiction, Eliot was resistant to grounding human life entirely in material process. She felt that *The Origin of Species* was fine, so far as it went, but that it left out the *mystery* of life: "to me the Development Theory and all other explanations of processes by which things came to be, produce a feeble impression compared with the mystery that lies under the processes" (1954–78: II, 227). In 1852, she had criticized Spencer's overly rigid theories; at "a proof-hunting expedition" at Kew, "if the flowers didn't correspond to the theories, we said, *tant pis pour les fleurs*" (1954–78: II, 40*)*. In her fiction, Eliot drew on Darwinian ideas in order to express, rather than reduce, the complexities of life.

In *Middlemarch,* set at the time of the first Reform Bill (1832), when the politics of evolution were most radical, Lydgate longs for "the true order," searching for a primitive, unifying tissue of life. Interconnectedness threw hierarchies into question: Bichat

> first carried out the conception that living bodies, fundamentally considered, are not associations of organs which can be understood by studying them first apart, and then as it were federally; but must be regarded as consisting of certain primary webs or tissues, out of which the various organs – brain, heart, lungs, and so on – are compacted[; now it] was open to another mind to say, have not these structures some common basis from which they have all started."

The very nature of existence was open to enquiring minds. The natural historian had viewed society as a collection of individuals; now life and society were being radically redefined as dynamic processes; communities were organic entities comprising interdependent individuals; reality itself was shifting and indeterminate. Even Casaubon ("a great bladder for dried peas to rattle in!" (83)) begins to doubt the efficacy of the process of fixing,

of pigeonholes, and for Mr Brooke they take on the randomness of the alphabet ("everything gets mixed in pigeon-holes: I never know whether a paper is in A or Z") (42)

Throughout his fiction, Hardy draws on the various shifts and developments within biology, broadening the franchise of creative possibility. He grouped himself "among the earliest acclaimers of *The Origin of Species*" (1928–30: 198) and, at the end of his life, listed as the thinkers most important to him "Darwin, Huxley, Spencer, Comte, Hume, Mill" (Weber 1965: 246–7). His notebooks record the assertion that "according to Zola the novel has passed out of the region of art into that of physiology and pathology" (Tilly 1883: 265), and 1890 in the *New Review* he argued:

> life being a physiological fact, its honest portrayal must be largely concerned with, for one thing, the relations between the sexes and the substitution for such catastrophes as favor the false coloring best expressed by the regulation finish that "they married and were happy ever after" of catastrophes upon the sexual relations as it is.

Hardy's narratives, in particular *Tess*, are punctuated with chance events, coincidences, roads not taken. With an appetite for alternative evolutionary accounts, Hardy "dipped" into Weismann (1928–30, I: 301), and drew upon his ideas in his fiction, but ultimately rejected this reductive hereditarian model. The Weismannian idea of germ plasm forms the basis for his poem "Heredity" and is refuted in "The Pedigree"; nonetheless, biological determinism reappears in his fiction, as he grappled with possible explanations for existence. Unlike many of his eugenic-minded contemporaries, Hardy would question the morality of the Spencerian dictum "survival of the fittest" (Arabella survives, in *Jude the Obscure*, but in what way is she fit? And, to complicate matters, her child is a morbid degenerate, suicidal and murderous, a product, *par excellence*, of Max Nordau's worst fears). In 1876 he copied into his notebooks a passage from Theodore Watts-Dunton: "science tells us that, in the struggle for life, the surviving organism is not necessarily that which is absolutely best in an ideal sense, though it must be that which is most in harmony with the surrounding conditions" (1985, I: 40).

Why was fiction so taken by developments within the life sciences? The twentieth century witnessed an increasing and increasingly alienating tendency toward specialization, culminating in the "Two Cultures" controversy of the 1950s and 1960s. By contrast, Victorian scientists and other sorts of people moved in the same circles and spoke a common language.

The life sciences were about life, and what could be more fitting material for artists, equally preoccupied by the meaning of life? The new biology was actively *appropriated* by writers and transformed; novelists did not passively "inherit" a theory of inheritance; they selectively *grafted* new ideas of natural and sexual selection onto old roots, or reworked them to meet new social and literary agendas (for further discussion of the relation between science and culture, see Cooter and Pumfrey 1994, Beer 1996, and Chapter 10 in this volume).

Sexual Selection

Darwin's *Descent of Man* made the origins of humankind explicit, and placed ideas of mating and heredity in the spotlight of scientific (and social) interest: "'sexual selection' – a subject which had always greatly interested me" (F. Darwin 1902: 46) – took up more than two-thirds of the whole. Thrust into the evolutionary scheme, sexual selection would not only account for mental and physical differences between the sexes but also emerge as "by far the most efficient cause" of "the differences in external appearance between the races of man" (1871: II, 385; see also Prichard 1813: 41–3). Sexual selection differed from natural selection (the survival of favored individuals in the struggle for life) in that it centered on successful breeding and was dependent, therefore, on the advantage which an individual had over others of the same sex and species solely in respect of acquiring a mate and reproducing. Sexual selection explained physical and mental differences between the sexes as advantageous in finding mates; Darwin also believed it to be the key cause of racial differentiation in humans. In *The Descent*, Darwin used sexual selection to explain why competition occurred not simply between but also within species. If natural selection was selection by nature, then sexual selection, highlighting the importance of sexual choice in the process of evolution, invested agency, and agency for change, in individuals. Blending biology, ethnology, and anthropology, Darwin was to cash in on the contemporary enthusiasm for biological explanations of culture. *The Descent* sold 4,500 copies within weeks of its publication, and was reprinted almost immediately (Desmond and Moore 1992: 579). Sex, and relations between the sexes, suddenly mattered to scientists. Darwin cited Schopenhauer, who argued that individuals ought to make sexual choices that would improve the health of the race: "the final aim of all love intrigues, be they comic or tragic, is really of more importance than all other ends in human life . . . it is not the weal or woe

of any one individual, but that of the human race to come, which is here at stake" (Asher 1871: 323 in Darwin 1874: 586).

Biology and Sex Roles

During the social and sexual upheavals of the nineteenth century, the boundary between the sexes became fraught with new and anxious uncertainty and was policed with a vengeance. Difference as an organizing principle thrives where divisions are not obvious. For example, while Hardy introduced Christian Cantle the hermaphrodite into *The Return of the Native* (1878) Frederic Harrison, social reformer and friend of George Eliot, declared: "Women must choose to be either women or abortive men. They cannot be both women and men. When men and women are once started as competitors in the same fierce race, as rivals and opponents . . . . Woman will have disappeared" (1891: 451–2). And, in his play of 1894, *The New Woman*, Sydney Grundy voices the same fears: according to his character Colonel Sylvester, Enid Bethune, author of the fictitious *Man, the Betrayer – a Study of the Sexes*, believes that "girls should be boys, and maids should be young men." Throwing down *The Physiology of the Sexes*, the Colonel declares: "Oh, this eternal babble of the sexes! Why can't a woman be content to be a woman? What does she want to make a beastly man of herself for? . . . these people are a sex of their own . . . . They have invented a new gender. And to think my nephew's one of them!" For Sylvester, the "Advancement of Woman" is the flipside of "the Decay of Man" (Grundy 1894: I, 1).

Biological determinism would prove a powerful counter-narrative to the emerging freedoms of the *fin de siècle*. From the early nineteenth century onward a newly emergent biology allowed pronouncements on sex to be made with greater certainty, and femininity, with its apparent attendant traits – care, maternity, morality – was increasingly biologized. Popularized through Spencer's synthesizing project, the idea that social and biological superiority were marked by increasing specialization intensified sexual difference in the name of higher civilization.

Darwin, for example, in his discussion of the "difference in the mental powers of the two sexes" in *The Descent of Man*, moving outward from differences between bulls and cows, wild boars and sows, wrote:

> woman seems to differ from man in mental disposition, chiefly in her greater tenderness and less selfishness; and this holds good even with savages . . . . Woman, owing to her maternal instincts, displays these qualities towards

> her fellow-creatures. Man is the rival of other men; he delights in competition, and this leads to ambition which passes too easily into selfishness. These latter qualities seem to be his natural and unfortunate birthright. (1871: II, 326)

That women were the bearers of moral biology sat neatly with the idea, ascendant in the nineteenth century, that sex for women was a duty, not a pleasure. Angus McLaren has charted the demise in the perceived relevance of female sexual pleasure in the act of procreation. In *Making Sex* Thomas Laqueur charts the same developments in the shift toward the biologizing of femininity, and Ornella Moscucci records an increasing emphasis on the function of the ovaries (a function discovered in 1826) as the search for the cause and proof of woman's otherness intensified (1990: 33). In the eighteenth century the most popular work on sexuality was *Aristotle's Masterpiece*, an anonymously authored compendium of information derived from Nicholas Culpeper, Albertus Magnus, and common folklore. Reprinted more times during the course of the century than any other medical text, *Aristotle's Masterpiece* urged not only that women were able to feel sexual pleasure, but also that it was indispensable for conception. These theories were upheld by the prevalent theory of the creation of new life – epigenesis (that all parts of a new creation developed sequentially). However, the emergence of preformation theories in the late seventeenth and early eighteenth centuries, both on the Continent and in England, attributed to woman a much more passive role than had the previous semence or two-seed theory. Preformation theories held that a miniature embryonic life was already in place within the mother, and embryonical development consisted only of growth, not creation. Although these were challenged in the later part of the eighteenth century by more sophisticated epigenetic views, there was no return to the two-seed theory. Instead, there was a general consensus that the new creation of life required two distinct building blocks. The stress on difference continued to underplay the role of pleasure in the woman's contribution. As part of this shift in emphasis, the sexually active woman of the seventeenth century was medicalized by the nineteenth as a passionless creature and there was increasingly open disagreement about whether femininity was constituted by purity or lust, tenderness or heartlessness.

In *Desperate Remedies* (1871), Hardy's anonymous tale of lesbian and heterosexual love which appeared in the same year as *The Descent*, he notes – and protests against – the shift from a one-sex to a two-sex model of sexual difference: "in spite of a fashion which pervades the whole community at

the present day – the habit of exclaiming that woman is not undeveloped man, but diverse, the fact remains that, after all, women are Mankind, and that in many of the sentiments of life the difference of sex is but a difference of degree" (183). But the intensification of sexual difference persisted. In 1899 the social purist Ellice Hopkins wrote: "Let us be of good cheer. Sex is a very ancient institution, the slow evolution of hundreds of centuries, and is in no danger of being obliterated by the fashion of a day" (93). Likewise, for Sarah Grand, the popular New Woman novelist and social-purity feminist, biology was central to sex: "womanhood is a constitutional condition which cannot be altered" (1892). In *The Heavenly Twins* Evadne, with a glint in her eye, declared that in championing sexual reform she was not so much ""revo" – but "evolutionary"" (230). "Revolution" ill-fitted the pronatalist embrace of civic virtue. As mid-Victorian ideas of duty were given a biological basis, women became bearers of moral biology, agents of racial regeneration, and men, in turn, began to be perceived as agents of degeneration. (The idea that women are morally superior still obtains among some strands of social and/or feminist thought: see, for example, Morgan 1982; for a discussion of the relations between feminism and biology over the last two centuries, see Richardson 2000.) Motherhood was a moral responsibility; a woman's first act in expressing a gendered citizenship of contribution rather than political entitlement. It conferred nobility, prestige, and power. Hopkins concluded her tract "The Present Moral Crisis" with the words "to you, as to woman of old, it is given to save your own nation" (1886: 24). Eve's role in the Garden was being rewritten, as women reinvented themselves as moral horticulturists. In *Darwin's Plots*, Gillian Beer writes: "evolutionary theory implied a new myth of the past: instead of the garden at the beginning, there was the sea and the swamp. Instead of man, emptiness – or the empire of mollusks. There was no way back to a previous paradise: the primordial was comfortless" (127).

There was no way back; but through a new, improved, and sexually responsible Eve, there might be a way forward, a way of regaining paradise lost. Reversing the androcentric bias of Darwin's account of human sexual selection, which assigned to men the power of selection, social-purity feminists argued that women would make sexual choices that would improve the health of the nation. Eugenics, the "natural" solution to the "population question," was figured as kind and feminine. In the *Eugenics Review*, founded by the Eugenics Education Society in 1909, Mrs. Alec Tweedie declared, "it is to the women of the country we must look in this great eugenic movement"; "could anything be more philanthropic than to stamp out degeneracy?" (1912: 857; see also Chapter 2 in this volume).

Degeneration and Regeneration

"Are we Degenerating Physically?" asked the *Lancet* in 1888, as it warned of the ill effects of urban migration for "the physique of the inhabitants of these islands." While the threat here is perceived to be environmental, the causes of ill health were increasingly being held as biological. In the same year the *Atlantic Monthly* posited, and to a much wider readership, a biological basis for crime. Concern over Britain's position amidst growing international imperialist rivalry converged with fears about national health and the strength of the imperial race (see Chapters 2 and 9 in this volume). The birth rate was perceived to be declining (among the middle class) and national health saw no improvement in spite of the institutionalization of public health. The early reverses of the Boer War whipped up these fears – Britain looked to be housing an army of invalids. According to official army statistics that were revealed in 1903 in the *British Medical Journal*, of 679,703 men medically examined for enlistment between 1893 and 1902, 234,914 were rejected as medically unfit, or 34.6 percent of the total. Of those accepted, some 5,849 "broke down within three months of enlistment" and another 14,259 were discharged as invalids within two years ("National Health and Military Service," 202, in Wohl 1984: 332).

Degeneration was in the air. Max Nordau's *Degeneration*, translated into English in 1895, heightened anxieties (see Pick 1989: 25–6 for its contemporary reception). Nordau recorded: "the prevalent feeling is that of imminent perdition and extinction," accusing contemporary artists of manufacturing a climate of biological pessimism (1892: 3; see also Talbot 1898, Morel 1857). Henrik Ibsen was a prime target: "there is not a single trait in his personages, a single peculiarity of character, a single disease, that he does not trace to heredity" (Nordau 1892: 350). The term *fin de siècle* was itself born of a biologization of time; the human body, its energies sapped, its health failing, was everywhere. Nordau questioned the sense of such incessant anthropomorphism: "only the brain of a child or of a savage could form the clumsy idea that the century is a kind of living being, born like a beast or a man" (1892: 1); but his own text was itself degenerative; morbid; pessimistic; hysterical.

For some writers degeneration was something to be celebrated. Even those who appeared to be turning against nature, taking refuge in a self-enclosed aestheticism, were still grounding their fictions in the biological sciences. Most notably, J-K. Huysmans's *A Rebours* (1884), which Dorian Gray found "the strangest book that he had ever read," is grounded in

physiology; the hero's history is biologically determined; a reworking of Edgar Allan Poe's "The Fall of the House of Usher," with the elements of Gothic terror which mingle with material disease ("It was, he said, a constitutional and a family evil" (Poe 1839: 143)) replaced by physiology: "The degeneration of this ancient house had clearly followed a regular course, with the men becoming progressively less manly; and over the last two hundred years, as if to complete the ruinous process, the Des Esseintes had taken to intermarrying among themselves, thus using up what little vigour they had left" (17). Des Esseintes (who knows his Darwin (Huysmans 1884: 164)) is well-versed in the language of biology: "it amused him to liken a horticulturalist's shop to a microcosm in which every social category and class was represented – poor, vulgar slum-flowers, the gilliflower" (Huysmans 1884: 96). The biologization of class that would intensify in the closing years of the century (see Richardson 1999/2000) already finds full-bodied expression in Huysmans's fiction. Unlike Huysmans, who delights in the artistic potential of degeneration, other male writers mapped cautionary tales onto their forays into the world of degeneration. The French naturalist, Zola, for example, points up the relentlessness of heredity, most notably in *Doctor Pascal: or, Life and Heredity* (1893), while in *The Time Machine* (1895), H. G. Wells depicted the descent of the urban working class into violent anarchy, and the ruling class into decadence and neurosis (see Pick 1989: 157–9). And in *Dracula* (1897), Bram Stoker's embodiment of contemporary fears, degeneration is represented, and *displaced* onto a foreign count who is finally conquered with a wooden stake. Nonetheless, the novel does not allay fears: contagion seeps through it; disease passes, invisibly, relentlessly, between bodies (see Pick 1989: 167–75). And, like the women that the state had sought to regulate in the second half on the nineteenth century, under the Contagious Diseases Acts, women in Dracula *spread* contagion: "nothing can be more dreadful than those awful women, who were, who are, waiting to suck my blood" (*Dracula*, ch. 4). Jonathan Harker recalls:

> I was afraid to raise my eyelids, but looked out and saw perfectly under the lashes. The girl went on her knees, and bent over me, simply gloating. There was a deliberate voluptuousness which was both thrilling and repulsive, and as she arched her neck she actually licked her lips like an animal, till I could see in the moonlight the moisture shining on the scarlet lips and on the red tongue as it lapped the white sharp teeth. Lower and lower went her head as the lips went below the range of my mouth and chin and seemed to fasten on my throat. (ch. 3)

A few years earlier, in contrast to this fearful, and wholly negative depiction of female sexuality, the feminist writer George Egerton had embraced a sexual freedom in "A Cross Line" (1893), perhaps her most famous story. This positive expression of sexual freedom is contained within a waking dream (literature was not yet able to take it beyond the realm of fantasy):

> she can see herself with parted lips and panting, rounded breasts, and a dancing devil in each glowing eye, sway voluptuously to the wild music that rises, now slow, now fast, now deliriously wild, seductive, intoxicating, with a human note of passion in its strain. She can feel the answering shiver of feeling that quivers up to her from the dense audience. (20)

Interestingly, despite their differences, both these depictions of female sexuality are intimately connected with contemporary ideas about empire and degeneration. For Stoker, female sexual desire signals the unrestraint that was leading to British self-contamination; for Egerton, unbridled female sexual desire would allow women to exercise their powers of selection to their full in sexual relations, and this would improve national stock. In the closing years of the nineteenth century popular engagement with biology became underpinned by a new, and overtly political, agenda. The Victorian novel had always been interested in successive generations of family, often taking the mechanism of legacy as the plot pivot, as is the case in, for example, *Jane Eyre* (1847), *Bleak House* (1852–3), and *Felix Holt* (1866). At the *fin de siècle* the novel was the obvious vehicle for exploring the implications of heredity for social and biological responsibilities – one of the most pressing questions of the decade. As New Woman novelists became increasingly taken up with regeneration, so romance was replaced by marriage as a mediator of genealogy. In a deft reversal of the male reason versus female intuition divide, several writers were arguing that female reason would put a stop to the racial disasters of masculine passion.

Symbols of the ugly ("diseased") and beautiful ("healthy") sustain social orders through biological narratives (see Gilman 1995). These narratives were coming into their own in the late 1800s and are exemplified in the work of novelist Grant Allen. In his treatise of 1877, *Physiological Aesthetics* (dedicated to Herbert Spencer), Allen set out his object as "to exhibit the purely physical origin of the sense of beauty, and its relativity to our nervous organization" (2). For Allen, beauty is joined to function. In an essay in *Mind*, he wrote there must be "such an intimate correspondence between the needs and tastes of each species, that the sight and voice of a healthy, normal, well-formed mate must have become intrinsically pleas-

ing for its own sake, as well as indirectly for its associations," extrapolating from this:

> the heart and core of such a fixed hereditary taste for each species must consist in the appreciation of the pure and healthy typical specific form. The ugly for every kind, in its own eyes, must always be (in the main) the deformed, the aberrant, the weakly, the unnatural, the impotent. The beautiful for every kind must similarly be (in the main) the healthy, the normal the strong, the perfect, and the parentally sound. Were it ever otherwise – did any race or kind ever habitually prefer the morbid to the sound, that race or kind must be on the highroad to extinction. (1879: 92)

Following the same line of thought, Egerton argued that the hermeneutics of the body be made simplified and accessible, urging for a universal, fixed, and exacting standard of health, and an easy way of identifying the "unfit" (arguments which have not been absent from debates surrounding AIDS and public "awareness": see Buckley 1986, Fee and Fox 1992). In Egerton's epistolary novel of 1901, *Rosa Amorosa*, the eponymous heroine declares "the whole world of men and women would suddenly stand in nudity, the moral effect would be colossal" in a moment of seeming (and seemingly anarchic) sexual liberation, but the moment is followed by a vision of a totalitarian health regime:

> all *false* shame would die a summary death, and the exigencies of continuing the ordinary duties of life would compel people to cast all consideration of it aside. The common idea of beauty would be entirely revolutionized; the human face would lose its undue prominence and become a mere detail in a whole; straight, clean limbs and a *beautiful form be the only thing admirable*; disease and bodily blemishes the one right cause for shame, and, as a result, concealment. (1901: 83–93, my emphasis)

Drawing heavily on biological discourses, Egerton's fiction points up ways in which women might realize their roles as agents of regeneration. As an example of Egerton's collusion with the new sociomedical interest in heredity, her epigraph to "The Regeneration of Two" – "love is the supreme factor in the evolution of the world" (1894: 163) – inks love indelibly into the master narrative of evolution.

Egerton believed that the early imposition of strategic reading programs would prepare girls for their regenerative roles. We learn of the heroine of "The Heart of the Apple" that there was "not one novel, not one romance" in her library (1897: 183); instead she has "books on birds and beasts and

fishes and plants" – books which would convey the facts of life without the fiction of romance; "the miracle of sex, underlying every natural law, its individual working in the propagation of the young, was no mystery to her, and consequently no subject for prurient musing." Likewise, the following year in *The Wheel of God*, Mary "had books, school books, on botany and zoology; and yet it was a sin to think of quite natural things if they touched on men and women" (1898: 44). Until novels could treat the facts of life with the same frank clarity as a zoological treatise it was best to steer clear of them. In *Margaret Dunmore: or A Socialist Home*, as Vera and Joe attend the return of Vera's childbearing strength, "the study of physiology was engaged in *au sérieux* by both. A class for instruction in this science had been organized under the roof of La Maison, and to it outsiders were made freely welcome" (1897: 127).

The life sciences seemed to many to hold the key to regeneration. Evadne, the heroine of Sarah Grand's sensational bestseller of 1893, *The Heavenly Twins*, bans the romantic novel from her reading, feasting instead on medical textbooks, which would impart the facts of life frankly and honestly. Among the books Evadne reads are the works of Galton, and Spencer (1893: 176). *The Heavenly Twin*s sold 20,000 copies in Britain within a few weeks, and more than five times as many copies in the USA (Kersley 1983: 72–3). Even *Tess* was being used for sex education; Hardy reported that numerous mothers "tell me they are putting *Tess* into their daughters' hands to safeguard their future" (Hardy 1978–88, I: 255). Tess herself rebukes her mother: "Ladies know what to fend hands against, because they read novels that tell them of these tricks; but I never had the chance o" learning in that way, and you did not help me!" (1891: 131).

As Grand saw it, it was the duty of women to rewrite the novel and cure civilization of its love-madness; the transformation of the plot of the romance and the sentimental as a more effective solution to the reading problem than direct censorship. In the words of Hugh Stutfield: "with her head full of all the 'ologies and 'isms, with sex problems and heredity, and other gleanings from the surgery and the lecture-room, there is no space left for humour, and her novels are for the most part merely pamphlets, sermons, or treatises in disguise" (1895: 837).

Reviewing *The Heavenly Twins* in *The Yellow Book*, Arthur Waugh asked: "what has [Sarah Grand] told us that we did not all know, or could not learn from medical manuals? And what impression has she left us over and above the memory of her unpalatable details?" (1894: 218). Interestingly, George Eliot had also been taken to task by male critics for putting too much science into her novels; Henry James, for one, complained that

"*Middlemarch* is too often an echo of Messrs. Darwin and Huxley."

Grand opened *The Heavenly Twins* with these words from Darwin: "I am inclined to agree with Francis Galton in believing that education and environment produce only a small effect on the mind of anyone, and that most of our qualities are innate" (1893: 1). In its study of the interchangeable qualities of twins, the novel has much in common with Galton's ongoing work on twins, which led him to conclude "a surprisingly small margin seemed to be left to the effects of circumstances and education, and to the exercise of what we are accustomed to call 'free-will'" (1882; see also Galton Papers 122). Sarah Grand was a staunch supporter of eugenic ideas. In 1896 she wrote in a letter to John Blackwood:

> I think further that it is in the action of woman in this particular matter, i.e. in regard to the improvement of the race, – that the one hope lies of saving our present civilization from the extinction which has overtaken the civilization of all previous peoples; and all I write is for the purpose of spreading this opinion and opening up these subjects to discussion.

Discussing the female franchise in an interview she gave in the same year, Grand declared:

> women are the proper people to decide on matters of population. Men have not managed to regulate either the population or the social question at all satisfactorily, and it would be well to give us a chance of trying what we can do. We could do much if we had the suffrage; the want of electoral power cripples our efforts.

She added that she hoped the marriage of certain men would soon be a criminal offence, and called publicly for the need for a "certificate of health" before a marriage could take place (Tooley 1896: 168). The following year, in her bestseller *The Beth Book*, Beth declares medical help for the "unfit" an unwelcome endeavor to hinder Nature's good work:

> Nature decrees the survival of the fittest; you exercise your skill to preserve the unfittest, and stop there – at the beginning of your responsibilities, as it seems to me. Let the unfit who are with us live, and save them from suffering where you can, by all means; but take pains to prevent the appearance of any more of them. By the reproduction of the unfit, the strength, the beauty, the morality of the race is undermined, and with them its best chances of happiness. (1897: 442)

Beth's diatribe is the fullest but by no means an unusual exposition in

Grand's work of negative eugenics as an act of *kindness* – a way of making the fit happy and the unfit extinct. As a further illustration of the extent to which eugenic ideas were being explored and promoted in fiction, Ménie Muriel Dowie, in her controversial novel of 1895, *Gallia*, charts Gallia Hamesthwaite's choice of a eugenically fit partner in preference to a dysgenic partner (Dark Essex): "people will see the folly of curing all sorts of ailments that should not have been created, and then they will start at the right end, they will make better people" (129).

The debates between the hereditarians and the environmentalists intensified in the last years of the nineteenth century. While Galton and his following were arguing for eugenic health certificates, and endorsing the elimination of the "unfit," Huxley was urging battle with nature, and, more precisely, with the nature which resided within each of us: primal impulses and instincts. The Russian anarchist and scientist Peter Kropotkin (1842–1921) was urging a third way; arguing that a basis for morality was to be found in nature, and that cooperation was just as necessary to the evolutionary scheme as struggle. In fiction, the humanitarian New Woman writer Mona Caird interrogated the hereditarian position, exposing the bias of biology and reclaiming the importance of environment and culture in shaping individuals (see Richardson 2001, 2002). She pursued the same line of argument as Huxley, arguing that nature was at best "primitive impulse and law, unmodified by human intelligence or moral development" (1894: 231). Human civilization and nature were at odds. The "primitive" mind was set against its transformed version in the social self.

At the close of the century, Sigmund Freud would give more precise formulation to the idea of internalized conflict, developing a new science of oppositions and submerged complexes and pointing up the unconscious determinants of actions (see Chapter 6 in this volume). Such ideas were not new to nineteenth-century conceptions of human nature. Passion and reason had warred in the novels of Charlotte and Emily Brontë and, more recently, Stevenson had given sustained expression to the divided self in *The Strange Case of Dr. Jekyll and Mr. Hyde* (1886). Psychology, which been developing apace over the course of the century (see Rylance 2000, Shuttleworth 1996), was too engaged with philosophical questions about the mind to subscribe to any theory of total hereditary determination of behavior and, as the hereditarians and environmentalists reached stalemate, psychoanalysis emerged as a new explanatory model, a means of resisting a biology that threatened to sweep all before it. Nonetheless, biology was crucial to the late Victorian and Edwardian quest to understand what it is to be human, and biological explanations

would be increasingly debated and pursued in the new century, culminating, at its close, in the Human Genome Project.

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