CHAPTER 2

Victorian Chimeras
(H. G. Wells, Thomas H. Huxley)

> You begin to see that it is a possible thing to transplant tissue from one part of an animal to another, or from one animal to another, to alter its chemical reactions and methods of growth, to modify the articulations of its limbs, and indeed to change it in its most intimate structure.
>
> H. G. Wells, *The Island of Doctor Moreau* (1896)

The scientific breakthrough Wells imagined at the end of the nineteenth century has become a reality in the twenty-first. In the past few decades, the questions raised by the creation of interspecies hybrids, xenotransplants, and chimeras have become pressing enough to prompt the Institute of Medicine (IOM) to issue guidelines covering the ethical constraints on such research. The guidelines were new when they were published in 2005, but the problem was not: as far back as the mid-1980s, scientists had successfully created pigs with human DNA, transgenic mice, the "geep" (a goat-sheep hybrid), and human-monkey hybrids made by grafting stem cells from one organism into another. Dr. Moreau's Monkey Man had seemed a monstrous fantasy at the time, but the questions Wells raised about the ethics of creating chimeras have a new relevance today.

H. G. Wells's novel *The Island of Doctor Moreau* tells the story of Edward Prendick's shipwreck and ten-month stay on an uncharted island in the Pacific where Dr. Moreau and his assistant Montgomery have established a biological station to conduct illicit experiments in xenotransplantation. A decade earlier, the discovery of Moreau's gruesome activities had led to his banishment from the London scientific community. Now the doctor has refined his technique and operates on animals to transform them into "grotesque travesties of men" (110). He has devoted his life to the study of the "plasticity of living forms"; he has learned to change "not simply the outward form of an animal" but the "physiology, the chemical rhythm of the creature"; the entire being can be "made to undergo an enduring modification" (97). By the time Prendick arrives, the island is

populated by some sixty of Moreau's creations. These "Beast People" include three Swine Men and a Swine Woman, a chattering Monkey Man, a loyal Saint Bernard Dog Man, a Satyr, the dangerous Leopard Man, and other "half-humanized brutes" (169). Even though Moreau's creations are formed by surgical rather than genetic modifications, they qualify as what scientists today call chimeras – mixtures of biological material from two or more species.[1]

The IOM report that discusses chimeras is a 166-page document titled *Guidelines for Human Embryonic Stem Cell Research*. It reviews the scientific potential of stem cell research, the ethical concerns attendant on it, the current regulatory environment, and the appropriate protections for embryo donors, and then recommends guidelines in this contentious area.[2] The report endorses human stem cell research but proposes limits and increased oversight to address the concerns of opponents.

Regarding chimeras, the committee recommends that any research combining human with nonhuman tissue should be permitted only after review by special oversight committees and that the creation of chimeras involving humans and nonhuman primates should be prohibited at this time. This recommendation is prompted by two concerns, both of which Wells anticipated in *The Island of Doctor Moreau* – the possibility that chimeras might breed and the risk of enhancing nonhuman intelligence. Primates receive special attention for fairly obvious reasons. The degree of genetic similarity to humans affects the likelihood of a chimera's developing human traits, and the size of an animal's brain influences whether its neural development can approach that of humans.

The media greeted this report with a parade of mythological and literary references and quoted scientists and medical ethicists who did the same. Maureen Dowd accused the committee of having "a fit of *Island of Doctor Moreau* queasiness" and quoted Henry Greely, a leading scholar of law and bioethics who spoke at the committee's two-day workshop, as remarking: "The centaur has left the barn" (Dowd A27). Nicholas Wade regaled readers with Lon Chaney in *The Wolf Man*, sphinxes, the Minotaur, mermaids, Caliban, and Medusa (D1). Scholarly articles about chimeras, before and after the report, mentioned the same imaginary monsters. For example, Karpowicz and his collaborators cite *Doctor Moreau* as evidence that the "sinister connotations" of chimeras in myth and literature "have probably had an impact on current negative perceptions of interspecies combinations" ("Ethical" 331). A 2011 report in the United Kingdom by the Academy of Medical Sciences on *Animals Containing Human Material*

notes that the term "humanized animals," now commonly "used in scientific literature to describe transgenic animals or chimaeras" (71), first appeared in Wells's novel. The report situates *Doctor Moreau* with other fictions such as Shelley's *Frankenstein* and Kafka's "Metamorphosis," which it sees as generating concerns that "we need to take seriously" (72).[3] More than a century after the publication of Wells's fable, it is still exerting an influence both on the public's view of the life sciences and on the discourse of science policy.

Misreading *Moreau*

Unfortunately, prominent policy experts have drawn the wrong conclusions from novels like *Doctor Moreau* and then used them to recommend positions that Wells would have rejected. Citing mythological creatures such as the Greek chimera itself or monsters from literature as evidence of our instinctive abhorrence to mixing species is common among conservative and religious bioethicists, particularly those Steven Pinker has labeled "theocons." What would dismay Wells, a passionate advocate of the biological sciences, is the attempt to use a feeling of repugnance as a principled argument for halting research on stem cells or other potential biomedical advances.

In opposition to this view, I want to emphasize two points. First, that *Doctor Moreau* actually weakens the case against creating chimeras by modeling an ethical stance toward this kind of research in the figure of the narrator. Prendick initially feels sympathy, not repugnance, toward the Beast Men, and his response contains a thoughtful assessment of the issues that surround the laboratory creation of chimeras. Although Prendick identifies both dangers that the IOM *Guidelines* saw as especially worrisome, the book as a whole cannot fairly be described as antiscience. Instead, it implicitly suggests standards for the ethical conduct of research on chimeras. Since bioethicists who endorse continued research on human-nonhuman chimeras have proposed some of the same standards, perhaps *Doctor Moreau* would have little to teach them. But it certainly holds a message for those who oppose such research – a very different message from the one they think it teaches.

Potentially more valuable to policy discussions is the historical juxtaposition of Wells's situation in the 1890s with that of our own time. The disciplinary status of the sciences was in flux in the late-nineteenth century. Its reputation was on the rise, and its role in the larger culture was growing. One of the most telling indicators of how science was on the

march was the threat it appeared to pose to the prestige of literature, a threat that Mathew Arnold made manifest in his debate with Wells's mentor, Thomas H. Huxley. This debate over the comparative value of science and literature had a large impact on nineteenth-century society, as did Huxley's related work to raise the prominence of science education in the universities. Hence, when Wells twice introduces Huxley's name into *Doctor Moreau*, we should understand the references to be more than autobiographical allusions to Wells's former mentor. They are indications of Wells's lifelong commitment to renegotiating the relationship between science and literature. In different ways, the careers of both Huxley and Wells turn out to be exemplary of the disciplinary changes that were shaping their times.

With the rise of the policy realm today, science is having to renegotiate its relationship with the larger culture as well. Increasingly since the 1960s, science has had to account for its impact on society as part of normal operating procedures – most overtly, in dealing with institutional review boards (IRBs); most consequentially, in adapting to policy recommendations; most confrontationally, in responding to social movements, which intermittently but insistently have protested a wide range of environmental and ethical impacts. The changes in the two periods are very different from one another. I do not mean to draw a parallel between the forces reshaping nineteenth-century science and those at work today. Rather I want to show how we can learn from the differences between these two historical moments. Comparative historical study can illuminate as much by juxtaposing the contrast between historical formations as by identifying their similarities. In this case, I want to draw attention to mistaken strategies proposed by Wells later in his career for bridging the gap between science and literature and argue that we not go down that road again.

Understanding the history of literature's relationship to science over the last 150 years will be a recurrent topic in this book. It is an important subject if humanists today are to capitalize on opportunities to participate in science policy discussions. Historical perspective can help us recognize the shape of the new configuration between the two disciplines, not misunderstand our moment, as did the cultural purists of the late-nineteenth century, like Matthew Arnold, who defended literature by emphasizing its aloofness and superiority to science, and those twentieth-century thinkers – characterized by Wells's later books and by C. P. Snow – who hoped that being a generalist could bridge the two cultures. Neither strategy worked in its day, and neither is appropriate for our own time.

Moreau and Prendick: Two Visions of Science

Prendick's adventures on a South Sea island make for a thrilling tale, one that combines elements of the shipwreck narrative, horror story, and Swiftian satire. His encounter with Dr. Moreau also contributes to a stereotypical critique of science comparable to that which has been derived from *Frankenstein*, *Dr. Jekyll and Mr. Hyde*, and *Brave New World*. Like each of these fictions, *Doctor Moreau* is deeply embedded in the intellectual currents of its day – in Wells's case, the debates over evolution, degeneration, and vivisection, as well as with the biology he learned as a student of Thomas Huxley. Yet the "lessons" of these novels have been consistently simplified and divorced from their historical moment and then adapted for films that further twist their meaning. Wells's portrait of an irresponsible scientist, driven to pursue his investigations at any cost, contributes to a prominent cultural stereotype: the mad scientist.[4] This vision of an egomaniacal scientist playing God is usually all that newspapers have in mind when they invoke the novel. Worse still, their memory of the mad scientist figure is usually derived from one of the wildly distorted movies.

The contrast between Moreau and Prendick, however, results in a more nuanced response to science. Prendick initially thinks that the Beast People have been created by altering humans to make them more animalistic. He fears that Moreau is using surgical means to accelerate what E. Ray Lankester called – in more biologically correct terms than Social Darwinists of the time – degeneration.[5] Although relieved to discover that Moreau's experiments were performed on animals, not humans, Prendick continues to be bothered by the cruelty of this research. Wells was aware of the antivivisectionist crusade of the previous two decades, and his descriptions of Moreau's cruelty to research animals are as harrowing as any in Wilkie Collins's attack on the practice in *Heart and Science* (1883). But Wells did not oppose experimentation on animals. In fact, his position resembles the normative stance of the scientific establishment (from the nineteenth century to the present), which objects to needless cruelty in research and medical education but finds animal experimentation justified in pursuit of legitimate scientific and therapeutic goals.[6] Prendick reflects: "Had Moreau had any intelligible object I could have sympathized at least a little with him" (133).

Prendick's next question involves the possibility of these new mixtures breeding. Just as the IOM committee is troubled by the idea of allowing chimeras to reproduce, Prendick is disturbed by the prospect of Moreau's Beast People bearing offspring. Moreau's assistant Montgomery admits

that they do, but he justifies the practice by noting that the offspring generally die and that besides "there was no evidence of the inheritance of the acquired human characteristics" (112). This latter comment is an echo of the anti-Lamarckian findings of August Weismann, whom Wells had been reading in the 1890s,[7] but the position remains relevant today. The IOM committee finds it "highly unlikely" that human cells "could contribute to the germline" of an animal already beyond the early stages of fetal development (*Guidelines* 33). Some members of the President's Council on Bioethics take consolation from the same point:

> The mixing that is being done so far . . . has not resulted in the emergence of altered human-like features or functions in the non-human. And interestingly, the reason why the new material has not produced a new compound creature seems to be that species are to a certain extent at least fairly impervious to tampering. Monsters aren't so easy to create. (Transcript, 4 March 2005)

To be on the safe side, however, the IOM committee recommends a ban against "breeding of any interspecies chimera" (*Guidelines* 5).

The concern with possible changes in nonhuman brains receives more extended consideration in Wells. Dr. Moreau expresses frustration at not being able to alter the brains of his chimeras enough to achieve something like full human cognition: "It is in the subtle grafting and reshaping one must needs do to the brain that my trouble lies. The intelligence is often oddly low, with unaccountable blank ends, unexpected gaps" (106). Prendick is aghast at Moreau's arrogance. It torments him to think that by raising the Beast People's intelligence, Moreau has produced creatures with a wholly new capacity for suffering. The Beast People have a new claim on Prendick's sympathy. They live in agony, both physical and mental, beset by internal struggles between the old animal instincts and a new humanlike consciousness.

To juxtapose the views of Wells and contemporary bioethicists is to induce a slight shock – both of incongruity and of recognition – when one sees the reactions of Prendick rephrased in the language of policy analysis. Because many people today think that the ethical status of a being is related to its "mental capacities such as the ability to feel pleasure and pain, language, rationality, and richness of relationships," ethicists are concerned that "neural grafting might change capacities in a way that changes moral status" (Greene et al. 385). They worry that "more humanlike capacities might also confer greater capacity for suffering" (Greene et al. 386). More blandly, the IOM committee remarks: "The idea that human neuronal

cells might participate in 'higher-order' brain functions in a nonhuman animal, however unlikely that may be, raises concerns that need to be considered" (*Guidelines* 33).

The urgency of this issue was brought home by the success in 2000 and 2001 of experiments in grafting human neural stem cells into the brains of mice (Uchida et al.) and fetal monkeys (Ourednik et al.). Most scientists agree that there are good reasons for undertaking research in this area, including testing potential therapies for spinal cord injuries and neurodegenerative diseases such as Parkinson's and Alzheimer's; learning whether neural stem cells can repair or regenerate damaged areas of the brain; and discovering whether functioning human tissue or organs could be grown in a host animal for later transplantation into humans. Scientists also believe it to be unlikely that transplanting human neuronal cells into postnatal animals would enhance intelligence to human levels, especially if three conditions are met: (1) the cells are dissociated rather than transplanted as a large mass or entire organ, (2) the cells are not implanted in the very early stages of fetal development before the native brain architecture has been established, and (3) the brain size of the host animal is significantly smaller than that of the human. It is these last two caveats that lead the IOM committee to recommend banning any introduction of human stem cells into nonhuman primate blastocysts (*Guidelines* 7), even though other commentators see less danger in such research.[8] Additionally, the IOM recommends that oversight committees be created to attend to how human cells affect the higher functions of the nonhuman brain (*Guidelines* 6).

The Emergence of Disciplinarity in Science and Literature

Drawing attention to the serious as opposed to the sensationalistic features of Wells's treatment of science could help deepen the public's response to an important area of biomedical research. Although literary criticism is unlikely to reach a wider public, introducing such ideas into the classroom would have a salutary effect. I know from experience that *The Island of Doctor Moreau* has a similar appeal to secondary school and college-age students as widely taught novels like *Animal Farm* and *Lord of the Flies*. When I draw out science policy issues from *Doctor Moreau* in the classroom, thoughtful and lively discussions of contemporary ethical questions invariably emerge.

A second approach to policy questions in the novel involves comparative historical studies. Because of Wells's deep interest in the place of science in

his time, his work illuminates the changing relationship between science and literature in the 1890s. According to Amanda Anderson and Joseph Valente, "disciplines are always constituted in relation to, and in a kind of dialogue with, other disciplines" (5). This is especially true of Wells and Huxley, who both wrote in and about academic disciplines on either side of the two cultures.

In the early nineteenth century, there was nothing like today's disciplinary structures. The sciences only began to assume their modern forms in the 1860s, and the humanities and social sciences developed still later in the 1880s and 1890s.[9] For most of the nineteenth century, discipline-based expertise was not the primary way a savant gained influence in the public sphere, much to the frustration of early advocates of disciplinarity such as Charles Babbage. By the dawn of the twentieth century, however, the existence of a professional elite, trained and credentialed in their respective disciplines, could be counted on as a resource by both government and industry. The story of this transformation has been frequently told, as has the tale of the divergent trajectories taken by the humanities and the sciences during the remainder of the twentieth century.[10] But these developments form an essential backdrop to understanding the new potential for the humanities to participate in public policy debates. The developments I refer to are most frequently identified by the phrase C. P. Snow coined in 1959: the split between the "two cultures." As is well known, Snow described the gulf between literature and science, using literature as shorthand for the humanities generally. Invoking his own career-long attempt to bridge the gap (and there is a strong affinity between the efforts of Snow and Wells), Snow lamented what he saw as the progressive worsening of the division, and he attributed it to the growth of specialization. Wells, too, struggled against this split, but his attempt (like all others in the twentieth century) must be judged a failure. Although Wells wrote best-selling books of popular science and successfully promulgated his positions on political and scientific questions, neither his fiction nor his nonfiction did much to reverse the widening gulf. Wells's choice to reject literary modernism did not bridge the gap, nor did his plea to scientists to write more accessibly for a general public. Disciplinary specialization was becoming increasingly necessary to modern science, and no amount of clarity or intellectual breadth could heal a breach that was a consequence of some of the largest social and economic trends in Europe and the United States.

There is an even greater irony in Wells's struggle. From his mentor Thomas Huxley, Wells inherited an abiding desire to reform higher

education by elevating the prestige of science and engineering in schools and universities. In the 1890s, this project took the form of insisting that science teaching needed to be laboratory based (one of Huxley's innovations at the Normal School of Science that Wells attended) and of advocating that scientists simplify their style and use a less technical vocabulary.[11] His goal was to spread science literacy throughout the general public and hence reduce the two-cultures gap. But he combined this mission with another, contradictory agenda, without recognizing how the two impulses worked at cross-purposes. This second agenda was an attack on the prominence of classical studies in the university, a cause also championed by Wells's mentor, Thomas Huxley. Writing of the "conflict of studies," Wells advocated replacing classics with more practical courses in science and engineering, thus driving another wedge between partisans for the humanities and the sciences ("Science Teaching" 23).

The parallel with those proponents of STEM education (science, technology, engineering and mathematics) today who call for the replacement of humanities classes in the curriculum with practical classes in science, engineering, and computer science is hard to miss. But such calls have become rallying points for some state legislators and business leaders, as well as by a few education reformists. Richard Posner typifies this vein of advocacy when he writes:

> Bright students have little to lose by substituting math and science for courses in postmodern literary criticism and cultural studies, sociology, women's studies, black studies, journalism, the Holocaust, film .... Society would not be worse off even if by concentrating on technical fields the bright students failed to become cultured persons in the sense in which "culture" denotes familiarity with the classics of the Western philosophical, literary, and artistic traditions. (*Catastrophe* 95)

Posner's rhetoric is more inflated than Wells's, but the position is largely the same.

Wells's campaign for science education exacerbated the two-culture split. As early as *Anticipations* (1901), Wells claimed that people with a scientific background were becoming "naturally segregated" (4: 255). Amid the "world-wide process of social and moral deliquescence" of the day, "a really functional social body of engineering, managing men, scientifically trained, and having common ideals and interests, is likely to segregate and disentangle itself from our present confusion" (4: 127). Wells's account of why this division was probable reads like a formula for manufacturing the two cultures:

> The practical people, the engineering and medical and scientific people, will become more and more homogeneous in their fundamental culture, more and more distinctly aware of a common 'general reason' in things, and of a common difference from the less functional masses . . .. They will be linked in professions through the agency of great and sober papers – in England the *Lancet*, the *British Medical Journal*, and the already great periodicals of the engineering trades. (4: 125)

Just as important to Wells, scientists will be trained in a new type of institution, the research university: "The old-fashioned university, secure in its omniscience, merely taught; the university of the coming time will, as its larger function, criticize and learn. It will be organized for research" (4: 234). There is a place in this new university for literature, but it will be, in the words of an earlier essay, a "clear and sensible" literature that spurns classics and "hates allusions and quotations" (Wells, "Literature of the Future," qtd. in David Smith, 85). As Wells continued in *Anticipations*, "To mumble over the past, to live on the classics, however splendid, is senility" (4: 234).

Rather than regretting this growing division, as might have been expected of a writer with a foot in both camps, Wells celebrated the emergence of a technocratic elite because he hoped it would produce the governing class of a new World State. In years to come, "the power that will finally supersede democracy and monarchy altogether, the power of the scientifically educated, disciplined specialist . . . will triumph" (*Anticipations* 4: 185). Wells felt comfortable trumpeting the demise of democracy and its replacement by the rule of technocrats because of science's reputation for detachment and impartiality. More disturbing still, Wells's unflinching displays of scientific reason justified him, in his own mind, in making heartless calculations, such as working out the competitive advantage that would accrue to a country that "sterilizes, exports, or poisons" its unfit people (*Anticipations* 4: 184).

Wells's example should give us pause when considering Posner's willingness to emphasize the technical fields even to the entire exclusion of "the classics of the Western philosophical, literary, and artistic traditions" (*Catastrophe* 95). Wells's solution to the conflict of disciplines, like Posner's, aligns him with the people whom Huxley, a great scientist, called "Goths and Vandals" who want "to sweep away all other forms of culture and instruction, except those in physical science" (Huxley 3:55). The answer, however, is not the integration of the humanities with the sciences – a vain hope – but collaboration among the disciplines, particularly on projects that raise pressing social, ethical, legal, and cultural questions. In pursuit of solutions to large, shared problems, the humanities, arts,

social sciences, engineering, and natural sciences may each contribute valuably from its own perspective without sacrificing the methodologies that give each specialty its ability to produce new knowledge and insight.

Prendick's Mentor, Thomas H. Huxley

The Island of Doctor Moreau is an indictment of irresponsible science, not all science, and of the kind of heartless experimenter that was even then a cliché of popular culture. It is critical, that is, of the very kind of unswerving rationalist Wells was to celebrate a few years later in *Anticipations*. Moreau freely admits: "I have never troubled about the ethics of the matter. The study of Nature makes a man at last as remorseless as Nature" (*Doctor Moreau* 102). Moreau's cruelty to the animals he operates on without anesthesia, his blind neglect of all ethical questions, and his disdain for the critics who drove him from London are judged harshly in the novel. Prendick's final verdict on this man is unsparing: "He was so irresponsible, so utterly careless. His curiosity, his mad, aimless investigations, drove him on" (*Doctor Moreau* 133).

Wells's novel establishes Moreau as only one pole of a spectrum of scientifically trained men whose other pole is the narrator. Prendick, it turns out, has been educated as a biologist at the Royal College of Science under Thomas Huxley himself. Moreau's assistant Montgomery represents a third variant of the scientifically trained person. He is a disillusioned young man who has washed out of medical school because of too much carousing and now spends his hours complaining about his lot. This range of attitudes and destinies contrasts with the "homogenous" class of "practical people" that Wells was to hail five years later.

Despite Wells's sympathy with Prendick, he understands that the cultured scientist that Prendick represents is not readily available to the specialist of his own time. The narrator harks back to a type of amateur experimenter and literary man who already had a marginal or residual role in the 1890s because of professionalization in both fields. At the end of the novel, Prendick has escaped from the island of horrors and has retired into the country, where he writes the narrative we are reading and spends his "days surrounded by wise books, bright windows, in this life of ours lit by the shining souls of men. . . . My days I devote to reading and to experiments in chemistry, and I spend many of the clear nights in the study of astronomy" (*Doctor Moreau* 185). Prendick's mixed predilections perfectly illustrate the unevenly professionalized culture of the late-nineteenth century, a position surprisingly epitomized by Thomas Huxley too.

From the very beginning of his career, Huxley was an eager participant in the push to professionalize science, working ceaselessly to reform university curricula, to infiltrate himself and his friends into leadership positions in professional societies, and to secure governmental posts, journal editorships, and prestigious university chairs. He was no leisured gentleman of science like *his* revered predecessor Darwin, who leveraged an 1830s scientific education and mode of practice into success in a mounting disciplinary regime. Rather Huxley was a self-made man, keenly aware of how a lack of disciplinary structures could be used to keep people such as himself out of power. (In this respect, too, he was a pattern for Wells, who rose from the working class to a position of influence.) For Huxley, organizing science into distinct disciplines was a way of democratizing intellectual labor and safeguarding the pursuit of truth from the interference of religious orthodoxy.

At the same time, Huxley also managed to emulate another cultural type, the scientist as literary figure or Victorian sage. Like Darwin and the other gentlemen scientists of the 1830s, Huxley was keenly interested in a host of topics that fell outside of his professional competence: art, literature, education, religion, and philosophy. His struggle to combine the role of public sage, reminiscent of an earlier generation of savants, with that of a dedicated professional scientist marks him as a transitional figure. A tireless advocate of disciplinary specialization, he was also an eloquent and versatile writer who addressed religious, ethical, and philosophical topics as widely as his sometime antagonist, Matthew Arnold. Indeed, Stephen Jay Gould nominates Huxley for the title of "greatest prose stylist in the history of British science" ("Introduction: Thomas H. Huxley" x).

One example of Huxley's writing will have to suffice. It is a small piece, Huxley's Romanes Lecture of 1893, "Evolution and Ethics," but it happens to be an address that influenced Wells as profoundly as anything he ever read. One of Wells's critics rightly remarks, "[t]here is almost nothing in Huxley's lecture which did not issue in a literary equivalent somewhere in Wells's work" (Haynes, *H.G. Wells* 26). Huxley's address is a tour de force, written near the end of his life under constraints both professional and personal that brought out his best energies. He had been asked to deliver the second in a new series of lectures at Oxford, following up the inaugural address by Prime Minister William Gladstone, whose uninformed pronouncements on evolution and religion Huxley had devoted the prior year to demolishing. Both speakers had agreed to avoid politics and religion, and both found ways to circumvent their pledge.

"Evolution and Ethics" treats fairy tales, the Book of Job, Buddhism, Heracleitus, and the Stoics before drawing a series of concluding parallels with the "modern doctrine of evolution" (9: 69). It is structured as an allegorical Progress of the Ages, but unlike much Victorian writing that saw civilization as steadily advancing, Huxley offers a cyclical vision in which each age finds a way to say something similar about humanity's place in the cosmos. Huxley is a rare example of a Victorian who confronted a disenchanted conception of deep time, rejecting popular views of evolution leading toward human perfection. "From very low forms up to the highest – in the animal no less than in the vegetable kingdom – the process of life presents the same appearance of cyclical evolution. Nay, we have but to cast our eyes over the rest of the world and cyclical change presents itself on all sides" (9: 49).

Huxley's survey of philosophical and religious precursors to evolution presents us with the repeated spectacle of intellectual pioneers who embraced a disenchanted view of life only to have their vision diluted by renewed mystification. Heracleitus is the clearest exemplar of this pattern. His understanding of the universe as nothing but "restless, fiery energy" was doomed to be watered down by the Stoics, who "metamorphosed" his ideas into "transcendental theism," "decked out with all the attributes of ideal Divinity" (9: 70–71). Buddhism, too, had at its core a rigorous, demystified vision. Huxley admires this "system which knows no God in the western sense; which denies a soul to man; which counts the belief in immortality a blunder and the hope of it a sin. . ." (9: 68–69). But the turn to the doctrine of Karma represented an error for Huxley, a renewed mystification aimed at mitigating the severity of Buddhism's ethical ideal. The notion that the transmigration of character from life to life gave each generation a chance to improve on its inheritance falls prey to the same wishful thinking, according to Huxley, as the contemporary belief in the idea of the "hereditary transmission of acquired characters" (9: 62).[12] Both are forms of grasping at straws.

The enduring contribution of "Evolution and Ethics" is its defense of human aspiration in the face of evolution's message that the universe has no higher purpose. Huxley argues against the "fallacy" of social Darwinists who think that because "animals and plants have advanced in perfection of organization by means of the struggle for existence and the consequent 'survival of the fittest;' therefore men . . . must look to the same process to help them towards perfection" (9: 80). The struggle for existence may be the law of nature, but "social progress" has given humans the power to resist this cruel law of nature and substitute "that which is ethically best"

(9: 81). Hence, Huxley scorns advocates of social Darwinism or the so-called "'ethics of evolution'" (9: 80). True ethics

> is opposed to that which leads to success in the cosmic struggle for existence. In place of ruthless self-assertion it demands self-restraint; in place of thrusting aside, or treading down, all competitors, it requires that the individual shall not merely respect but shall help his fellows; its influence is directed, not so much to the survival of the fittest, as to the fitting of as many as possible to survive. (9: 82)

The error of social Darwinism arises because people mistake "fitness" in the evolutionary sense with "best" when the term only means most adapted to existing conditions. In a passage that directly inspired the ending of Wells's *The Time Machine*, Huxley comments that if the planet were to cool again, the fittest organisms would be nothing more than lichens and microscopic creatures. Thus, social Darwinism is premised on a misunderstanding of evolution. It confuses adaptation to the conditions of existence with perfection of the species. "Let us understand, once for all, that the ethical progress of society depends, not on imitating" nature's struggle for existence "but in combating it" (9: 83)

Huxley's method for rising above the struggle for existence provides the key to understanding Wells's perspective on science in *The Island of Doctor Moreau.* Huxley likens the action of human intelligence on the process of evolution to the operation of a governor on a steam engine, which controls the mechanism of which it is a part through feedback.[13] The notion that the mind is part of nature, even as it potentially acts to modulate its environment, is a leap that few of his contemporaries were equipped to take. They saw the human ability to reason as evidence of what separated us from nature and as an argument against godless materialism. But this leap is exactly what Prendick advocates in the closing sentences of the novel. This vision of ethics as a feedback mechanism that checks natural processes is what gave Huxley – and later Wells – the certainty that a part of nature could rise above evolution. It gave both writers a rationale for a materialism that was not divorced from ethics.

The Use and Misuse of *Moreau* in Public Policy

Wells's perspective at the end of *Doctor Moreau* reflects Huxley's certainty that the truth of evolution did not vitiate humanistic ideals and spiritual strivings. Prendick, who represents the opposite pole of scientifically trained men from Moreau, refuses all the false consolations proffered by

social Darwinists and neo-Lamarckians in the 1890s and embraces, instead, a disenchanted view of "man's place in nature," to echo the title of one of Huxley's most famous books. After his rescue from the island, Prendick finds that his view of humanity has been undermined by strange doubts. He can no longer take solace in the thought that the people around him are different from the Beast People on the island. He feels a nameless sense of dread, an uncertainty, born of his realization that humans are part of the animal kingdom, that there is an unbroken continuity leading from the beasts in the forests on through to modern humanity. As he walks the streets of London, he fears that the men and women he meets are only "animals half wrought into the outward image of human souls and that they would presently begin to revert" (182). The prospect of reversion, rather than of upward progress, brings home Huxley's understanding of evolution as non-directional, potentially "cyclical," change.

This disenchanted view of human nature brings Prendick close to a breakdown. He feels a horror at his fellow men akin to what Kurtz experiences in Conrad's *Heart of Darkness*, published only a few years later, and Wells's depiction of the London streets is as bleak as anything in Eliot's *The Waste Land*.

> When I lived in London the horror was well-nigh insupportable. I could not get away from men: their voices came through windows; locked doors were flimsy safeguards. I would go out into the streets to fight with my delusion, and prowling women would mew after me, furtive craving men glance jealously at me, weary pale workers go coughing by me, with tired eyes and eager paces like wounded deer dripping blood, old people, bent and dull, pass murmuring to themselves, and all unheeding a ragged tail of gibing children. (183–84)

The traditional comforts of religion are unavailing: "Then I would turn aside into some chapel, and even there, such was my disturbance, it seemed that the preacher gibbered Big Thinks even as the Ape Man had done" (184). Instead, Prendick turns to "a mental specialist" (182) for help, seeking a modern remedy for a modern ailment. But nothing works, and Prendick eventually retreats to the relative solitude of the countryside.

In retirement, Prendick takes consolation from his reading and his chemistry experiments, but most of all, he finds comfort in his contemplation of the infinite spaces of the stars: "There it must be, I think, in the vast and eternal laws of matter, and not in the daily cares and sins and troubles of men, that whatever is more than animal within us must find its solace and its hope" (184–85). Victorian readers were prepared to hear

either materialism or humanism in these words, depending on whether they laid stress on the "*laws of matter*" or on the "*more than animal*," but it was hard to hear both unless they had taken to heart Huxley's message. Like his teacher, Wells is attempting to account for the purely material basis of life *and* for what – to use a twenty-first-century vocabulary – we might call the unplanned "emergence" of a consciousness that is more than material. Without pretending to explain the mechanism, both men were clear that the emergence of the human mind did not require a superior intelligence organizing life from above.[14]

The last paragraphs of "Evolution and Ethics" sound the same Pascalian note while emphasizing that anything in humanity that may be more than animal – literature, art, civilization, ethical behavior – is so only because it is part of, not above, the vast and eternal laws of matter: "Fragile reed as he may be, man, as Pascal says, is a thinking reed," Huxley writes; "there lies within him a fund of energy operating intelligently and so far *akin to that which pervades the universe*, that it is competent to influence and modify the cosmic process" (9: 83–84, my italics). For both Huxley and his disciple Wells, what makes human intelligence not only competent to, but worthy of, influencing its environment is a recognition that humans will forever remain part of that environment. Their future is tied up with the material universe to which they are akin.

The complexity of Huxley's and Wells's positions on "man's place in nature" makes it clear why invoking *Doctor Moreau* as evidence of our "natural" repugnance to chimeras, as has occurred frequently in debates about genetic engineering, is mistaken. It is crucial to situate literary perspectives in their own historical contexts rather than simply apply them to today's policy questions. It is not enough to invoke lessons from literature without also registering how they resonated in their day and how they intersect with the altered circumstances of the present.

An analysis of the current pair of writers, for example, would need to specify at least six relationships to science in the nineteenth century. (1) Darwin capitalized on the relatively incomplete disciplinary structures in place when he began writing in the 1830s and that remained viable throughout his productive years, enabling him to exert influence in scientific circles and in the culture at large; (2) Huxley was a transitional figure, able to retain some of the power of a Victorian sage like Darwin while also promoting and exploiting the emerging disciplinary environment of science; (3) at the same time, a figure such as Prendick had only a "residual" relationship to the new paradigm of professionalized science; while Wells himself shifted from (4) the posture he adopted in imitation of Huxley in

the 1890s to (5) advocacy of the "emergent" paradigm of modern disciplinary science in *Anticipations* (1901) and later texts; a change that (6) paradoxically estranged him from literary modernists in the early twentieth century, many of whom were embracing autotelic conceptions of art in part as a reaction formation to literature's increasing isolation from popularity and cultural power (see Chapter 5).

Prendick's residual relationship to professionalized science makes him less well equipped to deal with a demystified universe than figures like Huxley or Wells. Unlike Huxley, the great advocate of modern disciplinary structures, or Wells, who later in the twentieth century advocates for the research university, Prendick clings to amateurism. He is trapped between two worlds – he has the skeptical posture of a modern scientist without the disciplinary training or professional status of a specialist. He is a generalist in an age when that position is already becoming less tenable. Thus, his ethical perspective on animal research is ineffectual because it is ungrounded in any of the modern institutions that would give it force. It remains merely one man's opinion – sensible, well informed, but with little purchase on the emerging world of science.

Still, Prendick's difference from the position of the President's Council on Bioethics is stark and revelatory. "Would it not be degrading to our humanity and an affront to human dignity," one Council report asks, "to produce animal-human chimeras with some human features and some features of lower animals?" (Schulman 17). It was not an affront to *human* dignity that concerned Wells, and his novel should not be adduced as supposed evidence of our culture's repugnance to creating human-non-human chimeras. It was the realization that there was no difference between humans and animals that at first disturbed Prendick, and it was the realization of their shared place in nature that eventually brought him peace.

The reason *Doctor Moreau* seems to speak directly to contemporary ethical concerns about chimeras is that the place of ethics in research has changed in recent decades, a topic I broached in Chapter 1. For most of the twentieth century, the novel's message resonated only with stereotypes of the heartless scientist, a critical perspective that made literature's stance largely oppositional to science. Hostility to the excesses of science is certainly the lesson audiences derived from both the 1932 movie version of *Island of Lost Souls* (1932) with Charles Laughton and the grotesque 1996 film of *The Island of Dr. Moreau* starring Marlon Brando. Today, however, the same text carries more finely tuned resonances, which complement the efforts of people working within science to promote ethical

standards of research. To put it another way, the cultural location of bioethics and health policy is, at least in part, internal to science, which means that the stance of the oppositional (but ultimately powerless) outsider is no longer the only posture available to literature and the other humanities. Oppositional critics of science, who speak from philosophical or theoretical perspectives circumscribed by their own disciplines, are certainly not amateurs like Prendick, but their insights have slight impact because of their isolation from a disciplinary structure like the policy world that would give them force. As long as humanists speak only to fellow humanists, they will have as little effect on scientists as Prendick in his retirement.

What should a humanist say to a future President's Council on Bioethics if asked about *Doctor Moreau*'s lesson concerning chimeras? First, our hypothetical humanist would need to underline the obvious warning about scientific hubris. But then he or she would need to locate the novel in its time. Attending to the context of Wells's novel in the disciplinary conflicts of the day enables one to show that *Doctor Moreau* cannot be invoked as an indictment of all scientific research on chimeras. The qualified affirmations of the ending of the novel indicate something more interesting. They suggest that the novel's prophetic insights into the dangers of creating chimeras should be balanced against an equally profound respect for the importance of science, and for the value of pursuing research that acknowledges humanity's kinship to the universe.

Much more remains to be said about Wells and Huxley. It would be instructive to show how Huxley's comment about evolution reaching a summit and then taking the downward route to extinction (9: 86) provides the model for the far future depicted in *The Time Machine* (1895). Similarly, Huxley's remark about the possible supersession of humanity by other species forms the germ of *The War of the Worlds* (1898). Huxley's suggestion that both Karma and belief in the hereditary transmission of acquired characteristics were similar responses to the problem of undeserved suffering clarifies not only what Wells was attacking in *Doctor Moreau* but also what Collins was attempting to say in some rather muddleheaded passages in *The Legacy of Cain* (1888). Finally, Huxley's talk of future modifications of the human species gives scientific precision to themes in the air in the years before and after his lecture in a group of novels that feature divergent paths of human evolution: Edward Bulwer-Lytton's *The Coming Race* (1871), W. H. Hudson's *The Crystal Age* (1887), and, of course, the Eloi and Morlocks of *The Time Machine*.

These are some of the novels that I turn to next. In the following chapter, we encounter popular novelists who took a different path from Wells and instead of facing a materialist universe, cast about for reassuring answers to the doubts Huxley raised about "man's place in nature."