

## **H.G. Wells, Biotechnology, and Genetic Engineering: A Dystopic Vision**

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"Sometimes I call this reality Science, sometimes I call it Truth. But it is something we draw by pain and effort out of the heart of life, that we disentangle and make clear. Other men serve it, I know, in art, in literature, in social invention, and see it in a thousand different figures, under a hundred names... I do not know what it is, this something, except that it is supreme."

H.G. Wells

The writings of H.G. Wells offer a highly dialectical vision of science and technology as providing both tremendous benefits and dangers for human beings.<sup>1</sup> A prolific writer of novels, short stories, and works of non-fiction, Wells praised the wonders of science and technology, mostly in his non-fiction (Wells 1902 and 1938), but also sketched out potential horrors in his science-fiction writings (Wells 1996a, 1996b, and 1996c). While he frequently championed science and technology as great vehicles of progress, he also provided prescient warnings of their misuse and abuse. In particular, he anticipated that science and technology could create mutations in the human and generate new species, and that human beings were thus potentially a transitory phenomenon that could vanish like dinosaurs or Neanderthals.

Wells imagined that the coevolution of science, technology, and human beings could alter the forms of space and time, the patterns of human life, and produce both marvels and monsters. A believer in evolution, he imagined that the human species could mutate in surprising and discontinuous ways, anticipating positive leaps and negative regressions in the human adventure. Evolutionary perspectives are thus a major theme in Wells' work which carried speculation on the fate of humanity into the realm of what we are calling the "fifth discontinuity."

### H.G. Wells and the Fifth Discontinuity

The notion of the "fourth discontinuity" developed by Mazlish (1993) involved the perception that humans are not qualitatively different from machines and are imploding into machines. The fifth discontinuity, however, envisages that humans are creating, or that there could exist, a superior species and that humans no longer would be the sovereign power of nature. Such a condition would emerge if humans become subordinate to machines and the outgrowth of their labor. This discontinuity would suggest that the human race may degenerate or disappear as an offspring of evolution, or that a more intelligent and powerful alien species may appear to enslave or destroy humans. All of these possibilities were foreseen by Wells who emerges in our analysis as the prophet of the fifth discontinuity.

While Mary Shelley's Frankenstein can be read as an early modern response to the excesses of science and technology (see Best and Kellner 2001), Wells is thoroughly modern, residing in the world of automobiles, radio, airplanes, X-rays, movies, and wonder drugs. In some ways, Wells was a modernizer, reacting against the conservatism of the Victorian age and he saw science and technology as progressive forces. In an amazing anticipation of the Internet, Wells imagined a World Brain or World Encyclopedia that would contain all existing knowledge:

an immense and ever-increasing wealth of knowledge is scattered about the world today, a wealth of knowledge and suggestion that -- systematically ordered and generally disseminated-- would probably... suffice to solve all the mighty difficulties of our age, but that knowledge is still dispersed, unorganised, impotent (1938: 47).

To remedy the situation, Wells proposed that all knowledge in the world be gathered in the World Brain, "a new world organ for the collection, indexing, summarising and release of knowledge." This project would entail "the creation of an efficient index to all human knowledge, ideas and achievements... the creation, that is, of a complete planetary memory for all mankind." Projecting a technopopulism, Wells insists: "the whole human memory can be, and probably at a short time will be, made accessible to every individual... the time is ripe for a very extensive revision and modernisation of the intellectual organization of the world... this synthesis of knowledge is the necessary beginning to the new world. [The world] has to pull its mind together," through this new kind of "mental clearing house, the World Brain" (1938: 59, 60, 61, 26, 64, and 49).<sup>2</sup>

While Wells could thus perceive science and technology as progressive forces, he was also aware of the dangers of scientific experiment and technological development devoid of ethical vision and concern. In particular, Wells' short stories and novels exhibit his subtle and dialectical conceptions of science and technology. In his most popular and inventive stories (1996c), a similar formula is at work: his characters encounter a marvelous scientific or technological breakthrough or anomaly that could produce positive and wondrous results or could generate a disaster -- and often the outcome is ambiguous. This vision captures the contradictions and tensions of science and technology, which can yield both gains and losses. For example, in "The Stolen Bacillus" (1894) a scientist works on discovery of a cure to cholera, but the theft of his bacillus by a deranged anarchist could threaten the lives of the city, showing science capable of producing both cures to disease and new agents of destruction (1996c: 26-33). Likewise, in "The New Accelerator," it is not clear at first that the wonder drug which accelerates the characters' sense of time will be a blessing or a curse, though by the end of the story it appears to be catastrophic (1996c: 362-377).

Science fiction traditionally has articulated both utopian yearnings that science and technology would take us beyond earthly limitations into exciting new cultures and worlds, and worries that these forces would create monstrous and destructive artifacts and effects. Hence, the best SF portrays the adventures and grandeur of science and technology, as well as warning of its perils and dangers. Furthermore, it is SF, we

suggest, that maps the magnitude of the changes that scientific and technological revolutions are currently generating -- although we are arguing that both SF and critical social theory are necessary to illuminate the depth and magnitude of the turbulent transformations of the postmodern adventure.

Wells delivered what Isaac Asimov (1979) called "The Science-Fiction Breakthrough" by portraying the extreme discontinuities with the past that science and technology were producing. Wells pursued the "what if" logic of modern SF to new dimensions, conceiving radically other universes and beings, and anticipating developments in which humans are forced to discern that they are no longer the dominant species, just as earlier they were forced to recognize that they were not the center of the universe (Copernicus), a wholly unique species (Darwin), the rational master of their psychological life (Freud) or superior to machines (see the discussion in Best and Kellner 2001, Chapter 3).<sup>3</sup>

There are at least three domains of the fifth discontinuity, most of which Wells anticipated. First, there exists the possibility that machines might be created that are more intelligent than human beings (see Paul and Cox 1996; Morevac 1988; Kurzweil 1999). In one variant of this scenario, humans will assimilate technology that will dramatically increase their intelligence, longevity and powers, thus in effect creating a new superior posthuman species. In another scenario, humans will create machines, "mind children" (Morevac), or "spiritual machines" (Kurzweil), which will constitute an ascendent species of intelligent life (see the discussion in the following section). In these visions, human beings either merge with the computers and robots they are creating, or they become inferior and obsolete.

Secondly, humans could create a new species through biotechnology and genetic engineering that are more advanced than humans, as was anticipated in Victor Frankenstein's creation of new life forms, and Wells' science fiction. Whereas the first variant is rooted in conceptions of artificial intelligence, computer technology and robotics, the second conception is grounded in biotechnology and genetic engineering. Examples of suprahuman beings or new species created through biotechnology range from human replicants that are similar to humans but potentially superior, as in the films Blade Runner (1982) or A.I., to the creation of murderous alien species as in the Species films. These films provide cautionary warnings that current technologies of genetic engineering and artificial intelligence might produce entities that threaten human dominion and new survival.

While a new technospecies may someday come about through artificial intelligence and biotechnology, and dozens of transgenic species in fact already exist, the third type of fifth discontinuity is an entirely speculative possibility. This form of radical decentering of human beings would emerge if aliens appeared that are superior to human beings, a fear popular in SF literature and TV shows like The X-Files, Dark Skies, Prey, and First Wave. According to the celebrated "Drake's equation" which calculates the chances of alien life existing, the infinite time and space of the universe provides good odds that extraterrestrial beings exist and scientists like Carl Sagan have affirmed the

possibility, although these speculations have been disputed (see Best and Kellner, 2001, Epilogue).

In War of the Worlds (1898), Wells imagined that superior alien races could travel to earth and defeat and destroy humans, thereby decentering and dethroning humanity as the highest form of evolution. In the first major tale of interplanetary warfare, Wells instilled in the popular psyche a fear of aliens that remains a major constant of a tradition of SF and media culture. A pointed satire of imperialist invasion that elicited similarities to destructive forms of colonization in modernity, Wells' story provided a cautionary warning that imperialist forces themselves could be made subject to unknown and calamitous counterforces. Similarly, in his story "Empire of the Ants," he showed intelligent, giant killer ants naturally evolving in a Brazilian rain-forest and threatening humanity with extinction, suggesting again that humans could be displaced as masters of earth by other life forms (the 1977 disaster film Empire of the Ants, loosely based on Wells' story, by contrast, portrayed the giant ants mutating from nuclear wastes, adding an ecological theme).

In The Time Machine (1895) and The Invisible Man (1897), Wells portrayed humans mutating into new species and transcending the boundaries of space, time, and the forms of human being. Wells was a believer in evolution and imagined that the human species could unfold in surprising and discontinuous ways, anticipating positive leaps and negative collapses in the adventure of evolution. In The Time Machine (1996b), Wells portrayed humans as changing into new species. Envisaging the coevolution of humans, science, technology, and society, he foresaw the possibility of drastically different forms of human life and society. Moreover, in a ruthlessly negative, nihilistic vision, Wells depicts a terrifying future for humanity. The novel imagines an entropic collapse not only of civilization, but the earth itself, devoured in the red hot fireball of an exploding sun. In Well's dark vision, the Time Traveler discovers that humanity is sharply divided between species/classes in the year AD 802,701: the privileged Eloi who live above ground, and the super-exploited, subterranean Morlocks. The story allegorizes growing class divisions in society and how extreme differences between the classes could create different species and forms of (post)human being.

The Time Machine also articulates a critique of the Enlightenment notion of progress. Wells' Time Traveler "thought but cheerlessly of the Advancement of Mankind and saw the growing pile of civilization only a foolish heaping that must inevitably fall back upon and destroy its maker in the end" (1996c: ). Time travel in Wells' allegory is itself a metaphor for vision into the future of evolution and a warning that human species could fall prey to catastrophe rather than build ever new and better engines of progress. In his division of humanity into two transhuman species, the Eloi and the Morlocks, who are descendants of contemporary humanity, Wells warns that an irrational organization of society can produce monstrous results. The Eloi are hyperrefined and decadent, while the Morlocks are crude and degenerate, providing a parable of the deleterious effects of class division in which one group is condemned to constant labor while the other group suffers the effects of excessive leisure. The brutalization of the Morlocks allegorizes the outcome of a life of alienated labor, while the Eloi represent the results of excessively passive

consumption and leisure. There is thus a Marxist subtext to the story: unless exploitation stops and the division of a class society is overcome, the human species faces disastrous dichotomization, discord, and decline.

The Invisible Man (1996b) presents human beings shattering the limits of scientific possibility and creating a new type of freakish being. An alien among his own kind, Dr. Griffin is a Faust-like scientist whose "strange and evil experiment" (1996b: 153) succeeds on a technical level, rendering him invisible. But the discovery dooms him in the social context he cannot escape. Ruthlessly selfish, "powerful, angry, and malignant" (1996b: 137), driven toward immoral acts and insane visions, Griffin symbolizes all that can go wrong with science, as the communities he terrorizes unite against him. Griffin's knowledge remains secret, but the slumbering power of science to create miracles and/or monstrosities could be recovered and used at any time.

In two key novels, Wells anticipated biotechnology as presciently as he later foresaw the Internet. In Food of the Gods (1965 [1904]), Wells vividly portrays the possibly of destructive consequences of genetically modified food and, more generally, a culture based on unrestrained growth imperatives. The novel tells the tale of two scientists who with good intentions create "boomer" food that promotes growth processes in nature. To their horror, the technology runs amuck as everything from vegetation and insects to rats and human babies consume the food and grow to monstrous proportions. Wells not only offers a warning about tampering with food and metabolic processes for allegedly benign purposes -- such as genetically engineered "golden rice" touted today as the miracle panacea for human hunger -- he also ridicules the myopia of scientists who live in "monastic seclusion" from their social world and therefore easily conjure up misguided and dangerous schemes. The novel dramatizes a severe process of "genetic pollution" whereby the altered crops had migrated beyond the "Experimental Farm" and entered the food chain in less than a year before its first trials. Wells thereby anticipates a key problem with genetic engineering today, namely, the lack of adequate testing procedures and the rushing of genetically altered substances onto the market.

As if scripted by Wells' dystopian vision, today genetic scientists working for corporations such as "Metamorphix" have found a way to block the genes that limit an animal's natural growth, and consequently have produced giant chickens, sheep, pigs, fish, and other animals. Such violent disruptions of natural processes led to numerous deformities (see below), and thus scientists -- a la Dr. Moreau -- have conducted this research as far from the public eye as possible.<sup>4</sup> In a way faithful to current procedures, Wells underscores "the general laxity of method that prevailed at the Experimental Farm" (29). Moreover, he prefigures "a public so glutted with novelty" (68) that it tends to ignore the serious consequences of scientific and technological developments. Capturing the conflicts of the present, Wells portrays both technophilic groups adamantly in favor of the food and who believe that the technology is controllable, and technophobic groups (societies for the "Total Suppression of Boomfood" and the "Preservation of the Proper Proportion of Things"). The latter are vehemently against artificially-generated food and argue that the technology is uncontrollable. Wells thus captures the strident debates that mark the contemporary controversy over genetic engineering. While he observes the

beauty and improved features of the giant children, Wells largely portrays the new food technology as "distorting the whole order of natural life ... it swept over boundaries and turned the world of trade into a world of catastrophes" (134).

On this dystopian scenario, insects will rise up against us, the plant world will strangle us, and fish in the sea will destroy our ships. Soon, Wells imagines, only gigantism will reign, and all things of small scale will perish – including humans! Much as some today see genetic engineering as creating a new line of evolution within the human species, Wells' scenario forecasts a world where the food creates a "new race" such that a cleavage opens up between the little and gigantic groups. Allegorizing emerging global economic conditions, the novel concludes on a pessimistic note of a world given over to the imperatives of endless growth and ceaseless conflict as humans attempt to adapt to the rapidly changing conditions of technologies that control them -- rather than humans becoming masters of their technologies.

### Xenotransplantation and the Horrors of Genetic Engineering

"Strange as it may seem to the unscientific reader, there can be no denying that ... the manufacture of monsters -- and perhaps even of quasi-human monsters -- is well within the possibilities of vivisection."

H.G. Wells

The Island of Dr. Moreau (1996a [1896]) projects a frightening vision of an emerging condition in which human and animal life implode. In its multi-leveled complexity, the novel is a powerful protest against the self-proclaimed right of science to experiment on animals and to engineer new life forms. It provides a profound meditation on the conflicts within human beings endowed with reason, but unable to escape the violent legacy of their animal past. Forced to relocate his barbaric animal experiments to a remote Pacific island when exposed to the public by a journalist, Moreau undauntingly advances his project to create new life forms.

Shortly after his arrival to the island, the shipwrecked journalist Prendrick hears cries from the "House of Pain," smells antiseptic, and witnesses the sundry "Beast Folk" engineered by Moreau, a grotesque menagerie of transgenic freaks that include mixtures of hyena and swine, ape and goat, bear and bull, and horse and rhinoceros. Initially, Prendrick sees them as humans devolved into animals, but Moreau informs him that in fact they are animals he is trying to elevate into humans, changing not only their entire physical reality but also their minds to prohibit any "regression" to animal behavior. Encountering the shock of visions of "the strangest beings" (125) he has ever seen, Prendrick discerns that the island "is full of inimical phenomena" (157) and he condemns Moreau as a "lunatic" and "ugly devil" (107). Prendrick comes to the conclusion that Dr. Moreau, like Shelley's Dr. Frankenstein, "was so irresponsible, so utterly careless. His curiosity, his mad, aimless investigations, drove him on" (185).

Moreau, of course, has a different image of himself. Although he has perfected the art of scientific detachment, of separation of fact from value, indifferent to the pain he

inflicts on his victims, he imagines himself as a benefactor who is trying to improve the evolution of species. For twenty years, he devoted himself "to the study of the plasticity of living forms" (159). Rejecting any belief that nature and species boundaries are fixed, he seeks to "conquer" nature (167), to bend it to his will, to become God-like in his power to design species, while admitting that he has "never troubled himself about the ethics of the matter" (163).

In an uncanny anticipation of xenotransplantation and genetic engineering, Wells, speaking through Moreau, imagines 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 articulation of its limbs, and indeed to change it in its most intimate structure" (160). Yet, every time Moreau's chimeras seem to verge toward "triumphs of vivisection" (158), they revert to animality. Despite Moreau's conditioning that he believes makes it impossible for the chimeras to disobey his will, the hybrids regularly break his laws, and in time rebel and kill him -- the Beast Folk rampage out of control. At the end of John Frankenheimer's 1996 film version of Wells' story, the empathetic Prendrick, upon leaving, tells the subhumans he will bring back the best of Western science to help them, but a transgenic victim of this very science implores: "No more scientists, no more laboratories, no more research ... We have to be what we are."

Like The Invisible Man, The Island of Dr. Moreau crystallizes Well's antipathy toward scientific arrogance and its lack of social conscience. As Shelley and Wells anticipated, science and technology indeed can create monstrosities. Perhaps the most stunning image in scientific history shows a human ear grown on the back of a mouse, signaling the newly found powers of genetic transposition. Deformities are typical of cloned and engineered animals, as populations from the Fifth Discontinuity suitable for the island of Dr. Moreau are being spawned. In a blatantly unethical use of technology -- genetically engineering animals for maximal weight and profit on the meat market -- a Maryland team created the infamous "Beltway pig" afflicted with arthritis, deformities, and respiratory disease. Cows engineered with bovine growth hormone (rBGH) suffer from mastitis and various abnormalities. Giant supermice are afflicted with tumors, damage to internal organs, and shorter life spans, and numerous animals born from cloning are missing internal organs such as hearts and kidneys. Similarly, experiments in the genetic engineering of salmon and other fish have led to aberrations and deformities, with some growing up to ten times their normal body weight (See Fox 1999).

Gruesomely, scientists have created headless embryos of mice and frogs, dispensing with their superfluous heads so that they harvest only their organs -- a practice one imagines could easily be used on human embryos grown as mere organ sacks for genetic donors. In 1998, University of Minnesota scientist Jose Cibelli announced that he had pursued a secret experiment where he cloned (and then terminated) a human embryo by mixing his own DNA in the egg cell of a cow. According to Jeremy Rifkin, "this is the most extraordinary single development in the history of biotechnology because it now suggests that we can create new human-animal species" in the manner of Dr. Moreau ([www.msnbc.com/news/214299.asp](http://www.msnbc.com/news/214299.asp)). Indeed, Rifkin and cohort Ted Howard have

attempted to patent the first human chimera engineered, in order to preempt ownership from any scientist or corporation who might actually make one.

Their battle is uphill, however, for a myriad of chimeras is beginning to sprout everywhere. Following an earlier experiment at the University of Hawaii that mixed jellyfish genes with the sperm of mice, for example, researchers at the University of Oregon announced in December 1999 that they successfully inserted jellyfish genes into monkey embryos to create a transgenic model to study human fertility and diseases. Scientists transferred seven transgenic embryos into the wombs of rhesus monkeys, leading to one successful birth named "George." While the experiment may further scientific understanding, it may also pave the way for designer babies and a eugenic society, as it furthers the knowledge of how to add genes to human embryos to create desired life forms.<sup>5</sup> Unlike the more conservatively constructed Dolly, the sheep "Polly" is both cloned and genetically engineered, transformed to have a human gene in her biological code in order to produce a human blood protein. Besides, sheep, pigs, cattle, fish, and mice are some of the animals that now bear human genes, as humans prepare for an onslaught of animal genes to enter their body. In the age of radical hybridization, all genetic information is recodable and transposable, and thus we have decisively passed into the realm of the Fifth Discontinuity.

## Notes

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<sup>1</sup> Our study of Wells is extracted and expanded from our book The Postmodern Adventure. Science Technology, and Cultural Studies at the Third Millennium (2001).

2. We learned of Wells' concept of the "World Brain" through Robins and Webster (1999: 126-127) who in turn cite Muddiman 1998. Robins and Webster equate Wells' vision with Bentham's Panopticon and a "generalized Taylorism," dismiss it as "a perverse utopian proposal," "a utopia of technocratic planning, administration and management," which would, among other things, lead to a colonization and depletion of the public sphere (1999: 127). We see it, by contrast, as an incredible anticipation of the potential of the World Wide Web to make accessible knowledge and information to people throughout the earth, at their fingertips and for their disposal. This could also reinvigorate a severely decaying public sphere through providing information and new means of communication and public debate (see Chapter 5 below). Robins and Webster fail to discuss, moreover, the tensions between Wells' more scientific and technocratic thinking in his nonfiction, the profound and prophetic critical interrogations of science and technology, and their potentially catastrophic effects in his fiction. Hence, for us, Wells emerges as both a prescient critic of the dangers of science and technology and a prophet of the great transformation that, for better and worse, they would generate.

3. There are, of course, many other examples of SF writers describing new species, such as the metamorphoses at the end of 2001, Arthur C. Clarke's Childhood's End, Frank Herbert's Dune novels, Octavia Butler's "patternist" and "xenogenesis" novels, and, as we note below, works of Rudy Rucker and other cyberpunk writers. Wells, however, is the first to consistently project images of new superior species which displace the centrality of human beings, thus introducing what we are calling a "fifth discontinuity."



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<sup>4</sup> See [www.foxnews.com/science/042700\\_giants.sml](http://www.foxnews.com/science/042700_giants.sml).

5. The troubling implications of this scenario, of course, were a core preoccupation of Aldous Huxley, who continued Wells' speculations on a genetically-engineered society and creation of new species. Indeed, with only trivial qualifications, Huxley's Brave New World of genetic engineering, cloning, addictive pleasure drugs (soma), megaspectacles, and intense social engineering has arrived. Huxley thought cloning and genetic engineering were centuries away from realization, but in fact they began to unfold a mere two decades since his writing of Brave New World (1931). Technocapitalism cannot yet, for instance, biologically clone human beings, but it can clone them in a far more effective way -- socially. Whereas biological clones would have a mind of their own, since the social world and experiences that conditioned the "original" could not be reproduced, cloning a person according to a given ideological and functional model is far more controlling. That is why Huxley's sequel work, Brave New World Revisited, focuses on various modes of social conditioning and mind control.