

TOXIC GARDENS: NARRATIVES OF TOXICITY IN TWENTIETH-CENTURY
AMERICAN AND BRITISH FICTION

BY

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ABSTRACT

This dissertation studies the roots and development of toxic discourse in Anglo-American science fiction. I analyze a range of literary works, including Nathaniel Hawthorne's "Rappaccini's Daughter" (1844), H.G. Wells's *The Food of the Gods* (1903), Ward Moore's *Greener Than You Think* (1947), Rachel Carson's *Silent Spring* (1962), Richard Powers's *Gain* (1998), and Paolo Bacigalupi's *The Windup Girl* (2009). My consideration of this literary tradition marks a departure from early models of ecocriticism which focused predominantly on U.S. nonfiction and realist "mainstream" fiction. I trace the continuities and innovations in narratives of toxicity across four broad periods in the history of science fiction: early "proto-science fiction," which draws heavily on allegorical and mythic structures (particularly of the Edenic garden); the early 1900s, when the conventions of the toxic narrative begin to solidify in science fiction pulp magazines, and then shade into Cold War-era fiction preoccupied with nuclear fallout; a subsequent "*Silent Spring* era" that imagines landscapes and bodies haunted by pollution and pesticides as well as radiation; and post-modern/contemporary science fiction marked by complexity, ambivalence, and genetic determinism.

This study also delineates connections between the science and practice of toxicology and the literary artifacts that depict toxins, including memoirs, popular science writing, and comic books as well as science fiction novels and short stories. An SF-inflected toxic discourse also appears in late twentieth and early twenty-first century "mainstream" fiction. Across this wide body of literature, three themes appear consistently: a fascination with the permeability of bodies, the dramatization of mundane and/or invisible threats (especially through gender and reproductive failure), and a deeply ambivalent attitude toward technology and the scientists who wield it. In many cases, these texts display competing – and even contradictory – responses to these issues. While SF is best known for responding to cultural and techno-scientific developments, this study reveals that the genre is constitutive, in addition to being reflexive or interpretive; as such, the study of SF is crucial for understanding the development of an increasingly complex and culturally pervasive toxic narrative. This literature suggests a culturally practicable alternative to the ideal of a pristine, un-touched nature; the toxic narrative represents a serious effort to reconcile the global with the microscopic, the natural with the unnatural, and the body with its environment.

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INTRODUCTION

This dissertation studies the roots and development of representations of toxicity in Anglo-American science fiction. While science fiction is best known for responding to cultural and techno-scientific developments, this analysis reveals that the genre is constitutive, in addition to being reflexive or interpretive; as such, the study of SF¹ is crucial for understanding the development of an increasingly complex and culturally pervasive awareness of toxic exposure. This study additionally delineates connections between the science of toxicology and the literary artifacts that depict toxins, including memoirs, popular science writing, and comic books as well as science fiction novels and short stories. By identifying and acknowledging the conceptual potency of toxic discourse as it appears in SF narratives, this study provides a historical and literary context for ongoing debates about pollution, toxic exposures, and even genetic modification technology. In the process, my analysis re-frames two crucial moments in environmental history – the nuclear arms race and the publication of *Silent Spring* – as highlights in an established narrative of toxic threat, rather than their more common portrayal as radical and sudden epiphanies.

Literary history and ecocritical discussions of the rhetoric of pollution and toxicity have tended to focus rather tightly on mainstream fiction, nature writing, and memoir, while the scope of SF genre criticism on this theme has generally been limited to specific periods, authors, or types of threat.² The central goal of this dissertation is to provide a coherent study of the ways in

¹ I employ the designation “SF” after the idiosyncratic usage of author and editor Judith Merril; “SF” allows for the inclusion of a heterodox and interpenetrative array of texts including not only science fiction (conventionally abbreviated as “sf”), but fantasy, horror, speculative futures or alternate histories, and sf-inflected realist literature.

² For example, a fair amount has been written on nuclear war and weaponry, or the dystopian subgenre of ecological apocalypse.

which an environmental rhetoric of toxins and toxicity has shaped, and in turn itself been shaped by, science fiction.

I argue that science fiction has a unique, even central, role in this discourse. As we follow the historical trajectory of the genre's treatment of toxicity – from Renaissance poisoners to laboratory scientists (especially the figure of the “mad scientist”), to late twentieth-century understandings of toxicology and genetics – we discover that the genre can also *create* the toxic narrative. In this sense SF is constitutive, in addition to being merely reflexive. While the relationship between science fiction and science fact is by no means a simple pattern of cause-and-effect in either direction, one of the defining characteristics of the genre is its relationship to intellectual as well as scientific possibility. In Darko Suvin's famous concept of the *novum*, for example, the novelty and innovation of science fiction must still function in an analogical relationship to empirical reality; he associates science fiction with social purpose, because the *novum* offers new social possibilities which anticipate the “front-line of historical process” (*Metamorphoses* 81). The relationship between the imaginary worlds of SF and societal discourses is, in this sense, indissoluble.³

SF directly engages not only with technology but with the social, psychological, and aesthetic aspects of the use of technology, often in such powerful ways that the resulting genre tropes and conventions cross genre boundaries and enter the general cultural awareness. This complex infiltration of the boundaries of fictionalization and genre echoes the infiltration of toxins across the boundaries of body. While SF and realism are interpenetrating categories, SF is uniquely able to engage the reader with both its imagined/textual world and the relationship of

³ Indeed, Suvin goes further, claiming that a “*novum* is fake unless it in some way participates in and partakes in... a process intimately concerned with strivings for a delineation of men and their social life” (82).

that world to the empirical extra-textual world, and typically moves from individual tragedy to large-scale disruptions. In this mode, the narrative framework of SF opens up (if sometimes only indirectly) rhetorical resources for science writers, memoirists, and realist novelists. Indeed, it is for exactly this reason that I employ a fairly broad definition of SF in this dissertation – including texts written before the genre had fully cohered, and others that employ the conventions and tropes of SF while still generally being considered “mainstream” fiction.⁴

For the purposes of limiting the scope of this dissertation, I also restrict my primary texts to stories set on Earth, and largely avoid plots involving supernatural or extraterrestrial interventions. Although there are many excellent SF authors and texts that explore such scenarios (Nicola Griffith’s *Ammonite*, or Octavia Butler’s *Lilith’s Brood*, for example), and the displacement of contemporary anxieties onto other planets or xenomorphs is a long-standing SF strategy, it simply becomes unwieldy to examine such a wide-ranging body of texts.

Toxicity

We cannot pretend in 2014 to unlearn what we know about toxins, so a historical study of SF such as this one must define and read “toxins” retrospectively – both to understand the roots and development of SF’s toxic narrative, and to trace its generic development. The first task in a study of the toxic narrative is to settle on a working definition: what is a toxin? Most dictionaries use the terms “toxin” and “poison” interchangeably; the OED defines “toxin” as “a specific poison, which causes particular disease when present in the system of a human or animal body.”

⁴ This type of fiction is referred to variously as “slipstream,” “transrealist,” and “span” fiction. In their introduction to *Feeling Very Strange: The Slipstream Anthology* (2006), James Patrick Kelly and John Kessel argue that slipstream (a term coined by cyberpunk author Bruce Sterling in the July 1989 issue of *SF Eye*) is a literary effect, like horror or humor, rather than a distinct genre. Damien Broderick and Rudy Rucker posit a similar genre-bending literary mode they term “transrealism,” which mixes the fantastic elements of science fiction with the naturalistic approach of realism. Peter Brigg applies the term “span fiction” to mainstream fiction incorporating SF tropes.

By this definition, a toxin is a sub-set of the larger category of “poison,” distinguished by its specific effects on the body – it causes disease rather than death. A distinction between the two terms is not always observed even in scientific literature, although the Environmental Protection Agency uses a more rigorous definition: “A chemical, physical, or biological agent that causes disease or some alteration of the normal structure and function of an organism” (*NCI Thesaurus*). In its strictest technical usage, a toxin is a naturally occurring poison, often produced by a biological process (such as metabolism or enzymatic action). For the purpose of consistency, I use the terms “toxin” to refer to any hazardous chemical or biological substance, and “toxic” to describe the condition of any area or organism exposed to such substances. I far prefer the terms toxin/toxic to poison/poisonous. This is largely an issue of connotation; poisoning implies intent, and even treachery, while “toxin” lacks these associations with malicious agency. A toxin is defined by its effect on living organisms, rather than by any inherent properties – it is, so to speak, a conditional poison.

In a more specifically literary sense, the term can act as a linguistic link between the chemical and the organism. A given substance does not constitute a hazard – that is, does not become a toxin – until it interacts with a specific organism in such a way that the organism is materially damaged or compromised. A substance may be harmless in and of itself, yet cause potentially lethal chemical reactions when it is metabolized. Methanol, for example, is relatively inert until ingested, at which point it degrades to formaldehyde and attacks the optic nerve to cause blindness (G. Moore 5-15). Toxicity also can be highly idiosyncratic; a substance as innocuous as peanut oil can trigger a lethal allergic reaction in sensitive people while leaving the majority with no ill effects whatsoever.

A stunning array of substances can be classified as toxins. In *Toxicity and Risk*, Paul Illing identifies three broad categories of toxins: physical agents, including radiation, noise, and vibration; chemical agents, such as medicines, food additives, consumer products, industrial chemicals, warfare agents, and synthetic pesticides; and biological agents, such as vaccines and allergens (4). In one category alone – synthetic chemical agents – more than 60,000 substances are currently known to be potentially harmful to humans (G. Moore 5-2). Each of these toxic substances can trigger an array of illnesses and reactions. In one working definition,

Toxic substances are those that: (1) can produce reversible or irreversible bodily injury; (2) have the capacity to cause tumors, neoplastic effects, or cancer; (3) can cause reproductive errors including mutations and teratogenic effects; (4) produce irritation or sensitization of mucous membranes; (5) cause a reduction in motivation, mental alertness, or capability; and (6) alter behavior; or cause the death of the organism. (Malachowski 1)

To be considered toxic, the properties of these agents must be recognized as being detrimental to human or animal health. This “recognition” actually involves a complex scientific – and, especially after the Second World War, bureaucratic – process of discovery, investigation, and publication.

Reaching this broad agreement on a specific toxin’s effects can be extremely difficult, for a variety of reasons. Scientific consensus requires communication across multiple highly specialized fields, from organic chemistry to oncology. Regulatory structures and government agencies can present a labyrinthine obstacle. Data on toxins is often glaringly incomplete; these ontological gaps are the result of the difficulties of testing for long-term effects, the ethical

problems associated with animal and human testing, under-funding for toxicological research, and the potential for bias in studies funded by private corporations. Most of the information on the toxicity of chemicals is gleaned from studies that adhere to the traditional controlled, single-variable model, in which concerted efforts are made to isolate the effects of a single chemical by removing all environmental or potentially contingent factors. While useful, these studies are extremely limited in their predictive capacity.

It is also important to keep in mind the difference between a toxin and toxicity. Illing defines “toxicity” entirely in terms of perceptible effects, as “ill-health and environmental degradation” (5). Yet a substance generally recognized as a toxin may not necessarily have an observably toxic effect, depending on a number of factors – including the dose and concentration, an individual’s age, weight, and susceptibility, and interactions with other substances. For example, low-level exposure to polychlorinated biphenyls (PCBs) produces relatively mild symptoms in adults – chloracne, joint swelling, malaise – but causes devastating birth defects in fetuses exposed in utero (Moore 5-37). Some toxins can interfere with the development of fetuses while leaving the mother entirely unaffected. The effects of many toxic substances are additive, meaning that two substances acting together may produce a result entirely different than if the substances were to be taken individually at the same dose. Poor nutrition and pre-existing diseases can increase adverse toxic effects; other substances may have toxic effects only in certain concentrations or in certain animal or plant species. In the face of these complexities, many scientists and environmental activists prefer the far more general and inclusive term “environmental hazard” when discussing substances with variable or poorly studied effects.

Toxicology and Risk Society

A representational ambivalence regarding toxins can be identified as far back as the Classical tradition. Derrida famously examines Plato's use of the multivalent word *pharmakon* – which can mean “recipe,” “medicine,” “spell,” “poison,” or even “paint.” In Plato's *Phaedrus*, the Egyptian scribe-god Thoth offers King Thamus writing as a *pharmakon* (as in “remedy”) for his memory. Thamus refuses the gift on the grounds that it will only encourage forgetfulness: for him, writing is a *pharmakon* in the sense of “poison.” From this, Derrida defines the *pharmakon*, simultaneously both poison and antidote, as that which produces a disorienting play among oppositions: cure and poison, positive and negative, interior and exterior. Similarly, the sixteenth-century polymath Paracelsus (often called the “father of toxicology”) wrote, “All things are poison, and nothing is without poison; only the dose permits something not to be poisonous” (Sánchez-Bayo 9). This sentiment is commonly rendered as “the dose makes the poison.” This paradox has carried over into contemporary medical and laboratory practice, in which even lethal poisons can represent life-saving opportunities. Today, botanical poisons such as digitalis and curare are routinely employed as life-saving drugs; Taxol, a powerful chemotherapy agent, is derived from the Pacific yew tree (more specifically, from a symbiotic fungi found in its bark which synthesizes paclitaxel). In recent years, pharmaceutical research has also developed a number of medicines derived from reptile venoms; the anticoagulant Tirofiban and the hypertension treatment Captopril, for instance, are both modified versions of viper venoms.

Toxicology, the study of toxins and their effects, is a fairly recent field of specialization within chemistry and medicine. Its origin can be traced to the turn of the twentieth century, when concerns over industrial safety led scientists and efficiency experts to attempt to establish safety

standards for exposure to both known and novel substances. Much of this research focused on determining “maximum concentration levels” (later referred to as “Threshold Limit Values” or TLVs), the highest dose of a substance that can be detected before deleterious effects are observed. The field’s regulatory origins are important; from its inception, toxicology has been predicated on the search for acceptable levels of *risk* rather than an objective pursuit of health and safety. This focus on narrowly defined risk is a key part of what Ulrich Beck calls “risk society” – “a systematic way of dealing with hazards and insecurities induced and introduced by modernisation itself” (21). Risk society is built on a foundation of bureaucratic cost-benefit analysis and a given population’s perception and tolerance of an “acceptable” level of danger.

For Beck, the modern industrialized risk society constitutes a watershed in human history, marking a shift from a human condition subject mostly to naturally occurring hazards (disease, flood, famine) and socially determined hazards (invasion and poverty), to one of technological risks that are not only tolerated but deliberately undertaken. In a risk society the immediate benefits of a new pesticide or detergent outweigh their potential for long-term harm. When toxicology moved from the factory and into the larger scientific community, “it brought with it the assumption that industrial chemicals are a normal part of the environment and that the only relevant question to ask was at what level” they could be considered safe (Nash 656). In this model of toxicology, “what mattered was not the broader environment but the specific chemical exposure” and its observable effects (Nash 654).

The original theoretical framework of toxicology, based on the notion of perceptible and acceptable levels of exposure, also began to shift in response to the wave of synthetic chemicals developed during and after the Second World War. The TLV system works well for natural toxins like arsenic and lead, but is poorly suited to many novel substances, especially endocrine

disruptors like DDT. At the cellular level, these chemicals act like hormones, triggering receptors and causing swift reactions. At high levels they saturate and shut down receptors and are quickly flushed from the system; thus, low doses of disruptors may produce adverse effects, but not high doses. This behavior directly contradicts the foundational assumptions of toxicology. To model this complexity more accurately, toxicologists have developed the concept of the “body burden” – the record of an individual’s exposure to environmental contaminants from all sources. In 2004, the average American body burden included detectable levels of DDT and dioxin, 117 different organochlorine residues, and all 209 of the chemical varieties of PCBs (F. Buell 117). Toxicologists face an even more intractable challenge than accounting for systemic complexity: researchers conducting large-scale studies of toxic effects lack an uncontaminated control population. As of 2004, no human being anywhere today “has been born without some in utero exposure to synthetic chemicals that can disrupt development” (F. Buell 112). Toxins are no longer outside us; they are now an inseparable part of us.

The central assumption of toxic risk management is, as Nancy Langton points out, that “bodies and environments are separate enough that a toxic chemical can contaminate the soil, water, or air without contaminating people” (148). Toxins, and especially industrial chemicals, occupy a liminal position between bodies and environments which destabilizes any tidy division between the two categories: they are artifacts of an industrial society, yet operate within the realm of natural processes as fundamental as cellular metabolism and the water cycle. It is entirely possible that many of the more persistent synthetic chemicals “will continue to be a part of the world far into the future, beyond the point of remembering their origins as artificial or synthetic” (Roberts and Langston 629). If we consider that traces of synthetic chemicals, including pesticides, have been detected in human blood, breast milk, placental tissue, amniotic

fluid, and fat, we face the unsettling reality that humans “have literally merged with our material environment” (Vogel 667). Over the course of the past century, humans have been quietly, incrementally changed at the molecular level.

Ursula Heise has written a valuable discussion of popular perceptions of toxic risk in a specifically ecocritical context, and provides an excellent overview of the cultural variables of risk analysis: the “particular metaphors, plot patterns, or visual representations might have in the formation of risk judgments” (“Toxins” 762).⁵ These variables include “the distinction between voluntary and involuntary risk (people tend to be much more tolerant of voluntarily selected risks than those imposed by others...), the scale and controllability of adverse effects, the presence or absence of a particular kind of ‘dread,’ and the level of public trust in the authorities that manage a particular risk” (760-761). The crucial point, she emphasizes, is that the *perception* of risk can profoundly affect the representation of and response to one’s environment. Heise goes on to argue that

risk can invoke different genre models: the detective story, in the evaluation of clues and eyewitness accounts and in the discovery and exposure of the criminal; pastoral, in the portrayal of rural, unspoiled landscapes violated by the advent of technology; the gothic, in the evocation of hellish landscapes or grotesquely deformed bodies as a consequence of pollution; the bildungsroman, in the victim’s gradually deepening realization of the danger to which he or she is exposed; tragedy, through the fateful occurrence of evil in spite of the participants’ best intentions; or epic, in the attempt to grasp the planetary implications of some risks. (763)

⁵ In Chapter Five of this dissertation, I take up Heise’s call for an analysis of “the impact of the Frankenstein story ... on current perceptions of genetic engineering” (762).

I find the absence of science fiction from this list of genre models noteworthy because science fiction, more than any other literary tradition, encourages the narrative exploration of the causes, composition, and possible outcomes of risk in a techno-scientific society – to say nothing of an “attempt to grasp the planetary implications of some risks.” Indeed, one of the goals of this dissertation is to explore the often catastrophic consequences that be extrapolated imaginatively from our recognition of the risks posed by modern biological, genetic, and chemical experimentation.

The publication of Rachel Carson’s *Silent Spring* in 1962 brought the ubiquity of toxins to the attention of a wide popular audience, and therefore is a crucial cultural and rhetorical moment in the development of the toxic narrative. *Silent Spring* is discussed at length in Chapter Three; Carson describes “an ecology of the world within our bodies” which directly connects to the ways in which “in the ‘unseen world’ of the body, as in nature, ‘minute causes produce mighty effect; the effect, moreover, is often seemingly unrelated to the cause, appearing in a part of the body remote from the area where the original injury was sustained” (189). Carson depicts humans as part of an interdependent bio-ecological community, implicated in complex environmental systems. On the global level as well as the most intimate personal levels, human well-being simply cannot be divorced from environmental well-being. Galvanized by Carson’s book, a range of new fictional and non-fictional narratives emerged to frame these experiences and emotions; these modes, which Lawrence Buell collectively calls “toxic discourse,” draw on images of abnormality and disruption, fractured communities and compromised bodies, rather than the wilderness tradition of American nature writing or the preservationist rhetoric of early environmentalists.

Buell argues that toxic discourse “insists on the interdependence of ecocentric and anthropocentric values”; it is constituted by a sense of entrapment and toxic incursion, and the moral passion of pastoral betrayal and an underdog battle against impossible odds (639). He concludes that the “threat of infringement” is “fundamental to the discourse” (652). He then presents toxic discourse itself as “a possible prototype of environmental imagining” that allows us to redefine humankind’s relationship with the physical environment in a manner “that is neither preservationist, given its recognition of the impact of human powers and the legitimacy of human needs, nor conservationist, since its goal is not resource management so much as effective symbiosis” (657). Buell links toxic discourse most closely with the rhetoric of environmental justice, building on Beck’s idea of risk society. In the modern model of risk management, Buell writes, “science cannot prove safety, only the degree of existing harm”; since technology cannot be proven safe before its deployment, “toxic discourse starts to look not only conceptually justifiable but socially indispensable, particularly when the technology in question can be expected to produce what organizational sociologist Charles Perrow calls ‘normal accidents’” (661). Toxic discourse, then, is responding to the same techno-scientific risks and disruptions that inspire so much extrapolative science fiction.

In drawing on Buell’s construction of toxic discourse, I want to address the distinctive rhetoric of science fiction, a genre which he mentions only in passing. I argue that SF can step into the imaginative gap between a given technology’s inception and its “normal accidents,” because technology is one of the central concerns of science fiction. Indeed, in his history of SF, Roger Luckhurst defines the genre as “a literature of technologically saturated societies” (qtd Seed 2011, 47). In his 1978 survey of the depiction of technology in SF, Isaac Asimov identified two strands of development: an optimistic, “technophilic” trend (with which he identified), and

an opposite, “technophobic” fear of machines and technologies that escape human control. He called this the “Myth of the Machine,” a double-edged construction reflected in the wary, even paranoid attitudes toward technology in subsequent SF. Just as Buell’s toxic discourse oscillates “between implacable outrage and miserable uncertainty,” science fiction allows us to extrapolate these uncertainties out to wide-canvas hypotheticals – what if toxic discourse were to metastasize throughout the future? SF draws on and universalizes the basic structure of the toxic narrative to imagine collective modes of disaster.

In its ability to connect the personal and subjective to the scientific and global, SF also has a pronounced kinship to a distinctive branch of post-Carson nature writing: a genre of memoirs that explore the realities of toxicity on a subjective level as well as in terms of ecology or culture. In her book *Bodily Natures*, Stacy Alaimo describes these texts as “material memoirs,” writing that their central attention “to the material transit across bodies and environments may render it more difficult to seek refuge within fantasies of transcendence or imperviousness,” so that the authors are forced to “grapple with ways to render murky forces palpable or recognizably ‘real’” (16, 9). These material or toxic memoirs are filled with accusation and sorrow, but they are uniquely defined by their continuing and sometimes incapacitating anxiety, and by their implicit or explicit calls to action. After all, as Buell points out, “peoples’ responses to the effects of environmental crisis become much sharper and more urgent when they, not ecosystems or biota, are the victims” (111). The “toxic discourse” of such texts offers a literary version of what Ulrich Beck has called, more generally “staging,” the mediating role that cultural production has in making risks “real” (Wallace 158). These memoirs force the reader to register the embodied experience, as well as an otherwise invisible toxic threat.

One of the most famous of these “material memoirs” is Terry Tempest Williams’s 1991 memoir *Refuge: An Unnatural History of Family and Place*, a work Lawrence Buell has called “nature writing under the pressure of toxic discourse” (658). In the spring of 1983, Williams learns that her mother is dying of breast cancer. While she struggles to come to terms with her mother’s suffering and her own sense of loss, she returns again and again to a bird sanctuary on the shores of Utah’s Great Salt Lake. As her mother’s health declines, the lake begins rising to record heights, threatening the birds whose well-being has become a gauge for Williams’s own life. Williams repeatedly draws our attention to the fact that the troubled landscape of the bird sanctuary is the result of natural, cyclical forces – she processes the threat of the rising lake with sadness, but exhibits none of the anger or sense of betrayal common in many material memoirs. In time, Williams comes to accept both her mother’s death and the troubles of the refuge as inevitable.

After the elegiac tone of the main narrative, the epilogue, “The Clan of One-Breasted Women,” shifts dramatically from memoir to a call to action. “My mother, my grandmothers, and six aunts have all had mastectomies,” she writes. “Seven are dead. Two have just completed rounds of chemotherapy and radiation. I’ve had my own problems: two biopsies for breast cancer and a small tumor between my ribs diagnosed as a “borderline malignancy”” (Williams 281). She is frustrated by the apparently willful belief that this is merely coincidence or genetic bad luck – with her community’s attitude that “cancer was part of life” – when “living in Utah may be the biggest risk of all” (281). She then tells the story of “The Day We Bombed Utah.” As a child, she witnessed a nuclear test detonation over the “low priority” desert, and was subsequently exposed to more nuclear testing fallout from 1951 to 1962. She remains frustrated by the ineffectualness of the government and the medical establishment. “The more I learn about what it means to be a

‘downwinder,’” she writes, “the more questions I drown in” (286). Then, in a dream, she realizes that “A contract had been made and broken between human beings and the land. A new contract was being drawn by the women, who understood the fate of the earth as their own” (288). Paradoxically, the recognition of her human culpability in her environment’s toxicity radically renews her love for the landscape and her sense of hope for its renewal. In a way, her memoir can be treated as a first-person extension of Rachel Carson’s cautionary narrative – the natural world may be compromised, but it is not yet lost.

Williams’s book is a meditation on the profundity of the connection between bodies and landscapes; its combination of memoir, scientific observation, and political commentary provides the pattern for subsequent toxic memoirs. Published in 1997, Sandra Steingraber’s *Living Downstream: An Ecologist's Personal Investigation of Cancer and the Environment* brings together toxicity data only recently made available under right-to-know laws and newly released cancer registry data. Steingraber, a biologist diagnosed with bladder cancer at age twenty, follows fellow biologist Rachel Carson’s model of writing a compelling narrative that also incorporates scientific precision. Traveling back to her hometown of Pekin, Illinois, Steingraber follows the web of connections between her body and the invisibly chemical-laden environment in which she lives. In a recent essay, Steingraber writes about the ways that Carson’s life and work directly influenced *Living Downstream*:

From Carson I learned how to make visible the intercourse between our bodies and the environments these bodies inhabit. There is a kind of exquisite communion between the external biological world that we can see and the hidden one inside our skins that we know as self but seldom get to look at. Exploring the permeable boundary between the two is

almost always fresh and exciting for readers, and it breaks down the erroneous assumption that the environment is something ELSE, something OUT THERE apart from ourselves. (“Fact and Fiction” 223)

Carson dramatized the invisible threats of toxicity by showing readers the victims – children, songbirds, shade trees – as well as the science of toxicology as it was known in the early 1960s. Steingraber takes this rhetorical strategy further, to the personal level of survival memoir. She identifies with Carson’s need to conceal her own breast cancer to avoid the perception that she wrote *Silent Spring* from a place of accusation or hysteria rather than scientific objectivity. In the thirty years between the publication of their respective books, Steingraber believes that the cultural work of feminism has legitimized “the idea that a woman’s individual experience was a valid way of knowing the world”; she writes, “I hoped my scientific objectivity would not be doubted simply because I had had a bladder tumor removed” (222). Those “thirty years of feminism,” she continues, “opened up a critical space in our culture that allows memoiristic recollections to exist side by side, or even intertwined with, dispassionate, hardheaded analysis.” Her hope was “that the thread of a compelling human story could seduce readers through some fairly complicated toxicology, organic chemistry, and molecular epidemiology that they might otherwise not be willing to read (225). In the final chapter of her book, Steingraber passionately decries the spreading use of carcinogenic chemicals, and calls for support of the emerging environmental human rights movement. The personal has, to borrow a phrase, become the political.

More recent toxic memoirs have departed significantly from this explicitly Caronesque activist bent. In 2001’s *Body Toxic: An Environmental Memoir*, Susanne Antonetta presents her life story at the most personal level; her body mirrors the compromised landscape of the New

Jersey boglands (the “Barrens”): infertile, plagued with inexplicable pain, cancers, and growths. The memoir is structured as a back-and-forth between biographical records and environmental records, sandwiching transcripts from her girlhood diaries between EPA reports and facts about nuclear particulates. This structure sometimes leads to extraordinary juxtapositions. Antonetta remembers her grade-school fascination with menstruation, and her almost fetishistic treatment of her sanitary belt (“Kotex, the only permissible thing for half-Catholic girls in New Jersey to use”); two pages later, in a transcript of Congressional testimony about the Oyster Creek nuclear reactor in her neighborhood, an engineer recalls shipping radioactive liquids in crates lined with Kotex-brand pads. “We bought Kotex by the truck-load, almost by the railroad-car-full. What keeps a nuclear plant running is lots of Kotex, lots of masking tape, and lots of plastic bags,” he reports (26). A large-scale toxic threat is connected to Antonetta’s embodied experience in the most intimate way imaginable.

These memoirs show “how profoundly the sense of selfhood is transformed by the recognition that the very substance of self is interconnected with vast biological, economic, and industrial systems that can never be entirely mapped or understood” (Alaimo “Ecology” 23). This blending of subjective narrative and “hard science” suggests, on a structural level, the toxic memoir’s sense of the inseparability of the synthetic and the natural. This structure also provides a model for the toxic memoir’s generic cousin, the realist toxic novel. While SF tends to unlock the dystopian potential of toxins by focusing less on individual tragedy than large-scale socio-biological or environmental breakdown, most realist toxic fiction simulates the memoiristic focus on the subjective experience individuals.

Beginning in the 1970s, traditional realist novels increasingly begin to address issues of pollution, toxicity, and other environmental hazards; depictions of toxic waste boomed after

WWII dumping and especially after the Love Canal scandal in 1978, the subsequent formation of high-profile anti-toxic activist groups such as the Citizen's Clearinghouse on Hazardous Wastes and The National Toxics Campaign.⁶ These issues quickly found literary expression in what Cynthia Dietering calls the "postnatural novel." She takes the idea of the postnatural from Bill McKibben's work on modern environmentalism – he uses the term postnatural to describe the despairing knowledge that humans have fouled our own nest. By the mid-1980s, Dietering writes, chemical contamination had become a novelistic preoccupation, figuring as an important theme in texts such as DeLillo's *White Noise*, Walker Percy's *The Thanatos Syndrome*, T. Coraghessan Boyle's *World's End*, and Richard Russo's *Mohawk*, and as important subtext in many more (197). Like toxic memoirs, these novels are populated by characters haunted by a sense of being somehow exiled from nature. They express "the peculiar displacement of a generation poised... between the knowledge of the earth as home and nature and knowing the earth as toxic landscape," a literary extension of Bill McKibben's post-natural world (Dietering 200).

In both novels and memoirs, the toxic consciousness of modern risk society begins to reshape ideas of character and identity. One of the hallmarks of the toxic novel is characters' willful ignorance, or even conscious rejection, of toxic threats. In Don DeLillo's *White Noise* (1985) Jack Gladney, a professor of "Hitler Studies" at a small Midwestern liberal arts college, experiences the breakdown of his body and his marriage under the strains of chemical encroachment. In the second and longest of the novel's three parts, "The Airborne Toxic Event," a derailed train releases a toxic cloud of "Nyodene D." over Gladney's town, prompting an evacuation. His stubborn reluctance to acknowledge the danger of the airborne toxic event

⁶ The Love Canal, located in Niagara Falls, NY, became famous after a grassroots campaign forced Hooker Chemical to remove toxic chemicals it had dumped and buried in the area.

speaks to his fundamental belief in the security afforded by his academic prestige and middle-class comforts.

The novel's postmodern narrative style – diffuse, elliptical, ironic – echoes both the inchoate threat of the toxic event and the larger, complex worldview of the postnatural novel.⁷ De Lillo uses irony to maintain an almost comic distance between his characters and the frightening physical reality of toxic exposure. Lawrence Buell singles out *White Noise* as an example of the ways in which “Toxic discourse may repress, fail to fulfill, or swerve away from itself according to the drag of other formations with which it cross-pollinates” (in this case, the postmodern novel). He concludes that “ecocatastrophe is invoked only to be reduced to the status of catalyst for the unfolding of the deeply banal inner life” – specifically Gladney and his wife’s “chronic, narcissistic death-obsessions, which are longstanding and only fortuitously linked to the precipitating event” of the Toxic Airborne Event (663). The novel’s toxic threat is indeed poorly defined; a “cheerful” announcer on the radio continually amends the list of exposure symptoms, which include “convulsions, coma, miscarriage” and *déjà vu* (De Lillo 118, 122). Gladney’s adolescent son Heinrich happily dispenses technical information about the Airborne Toxic Event to an audience of evacuees: “it’s colorless, odorless and very dangerous, except no one seems to know exactly what it causes in humans or in the offspring of humans. They tested for years and either they don’t know for sure or they aren’t saying. Some things are too awful to publicize” (127). Gladney insists that any symptoms his family exhibits are only psychosomatic since he himself feels nothing.

⁷ For an excellent study of DeLillo’s narrative style, see Matthew Packer’s “‘At the Dead Center of Things’ in Don DeLillo’s *White Noise*: Mimesis, Violence, and Religious Awe” (2005).

Government technicians inform Jack that the real, ongoing airborne toxic event is ultimately valuable for its potential to help prepare for future disaster simulations. These nebulous definitions of both reality and toxicity ultimately create the same anxiety and loss of certainty. Indeed, both Buell and Heise argue that the toxic threat in *White Noise* is only one of an array of perceived dangers in Gladney's death-obsessed worldview. Heise points out that in the risk-scape of the novel, the Airborne Toxic Event "is by no means exceptional but simply a threat that is (or appears to be) much larger than other hazards in the Gladneys' universe (752). Still, the fundamental lack of certainty about the nature of the Airborne Toxic Event lends it more horror than the various pills, potions, and fumes that surround the Gladneys every day. There is no way to predict the long-term effects of the chemical. Jack's exposure is visible only as a computerized data profile, full of "bracketed numbers with pulsing stars." A technician tells him that his prognosis is "a question of years. We'll know more in fifteen years" (140). The effects of toxicity are projected into the future – a projection which, at its core, is one of the generic markers of science fiction.

Obviously, both the toxic memoir and the toxic novel share similar subject matter and explore similar anxieties, but the fictionalization in novels universalizes the toxic narrative in a way that the subjective focus of memoir – however thoroughly contextualized – often precludes. Cultural critics have mapped the ways in which fiction and literature supplement and extend the concerns of the toxic memoir. Alaimo writes that fiction can "dramatize the epistemological ruptures that occur when people confront the troubling invisibility of dangerous substances and forces of risk society" ("Ecology" 23). Similarly, Susan Squier contends that "literature can articulate an alternative to the dominant discourses of risk management and expert control" that so often inform policy debates ("Agricultural Studies" 22). The toxic memoir and the toxic novel

explore similar anxieties, and the novels often employ the same explicative strategies of the first-person narrators of memoir, using scientific fact and historical specificity to work through the repercussions of life in a post-natural risk society. Genre conventions sometimes make it difficult for a realist novel to incorporate extensive scientific asides about endocrine disruptors or body burdens, but the fictionalization of the toxic narrative provides a sense of universality that the subjective form of the memoir often forecloses.

Science fiction, then, is uniquely and perfectly suited to exploring the implications of the toxic narrative; it jettisons, often gleefully, the constraints of spatio-temporal realism. As a genre, SF is devoted to precisely what memoirists and other toxic novelists tend to shrink from: projecting out from individual and subjective experience in both scale and chronology, to imagine future histories not restricted by the demands of realist representation. It is, as Sherryl Vint puts it, “a discourse that allows us to concretely imagine bodies and selves otherwise, a discourse defined by its ability to estrange our commonplace perceptions of reality” (19). When one reads a mainstream novel such as DeLillo’s *White Noise*, one finds toxic threats represented as limited to the individual and the local; in contrast, SF would take a line like the SIMUVAC technician’s “we’ll know more in a few years” as a jumping-off-point for a narrative that is fundamentally about the consequences of seemingly isolated events that grow into general catastrophe. Whereas the memoir is largely focused on the past, and the toxic novel is grounded in the now, SF attends to the myriad “what ifs.”

In this dissertation, I trace the continuities and innovations in SF narratives of toxicity across four broad periods in the history of science fiction: early “proto-science fiction,” which draws heavily on allegorical and mythic structures (particularly of the Edenic garden); the early

twentieth century, when the conventions of the toxic narrative begin to solidify in science fiction pulp magazines, and then shade into Cold War-era fiction preoccupied with nuclear fallout; a subsequent “Carson era” that imagines landscapes and bodies haunted by pollution and pesticides as well as radiation; and post-modern/contemporary science fiction marked by a complex and ambivalent relation to toxicity, increasingly expressed through deterministic scientific models of genetics.

In Chapter One, I identify the foundations of the toxic narrative in science fiction. I argue that the mythical and allegorical roots of the toxic narrative profoundly influence the nascent genre conventions of SF, and vice versa. I begin with two works which might reasonably be called “proto-SF”: Nathaniel Hawthorne’s “Rappaccini’s Daughter” (1844) and Oliver Wendell Holmes’s *Elsie Venner: A Romance of Destiny* (1861). Both tales center on the mythic figure of the “poison maiden.” Their allegorical forms provide a rhetorical framework for an emerging discourse of large-scale industrial pollution, especially smoke and smog. I analyze Robert Barr’s 1892 short story “The Doom of London” as a representative example of this genre of proto-SF. I continue on to H.G. Wells’s 1904 novella *The Food of the Gods* (1904), in which we can see Wells refining the genre-specific tropes of the SF toxic narrative. I conclude with a survey of the pulp science fiction of the early twentieth century, from stories that cobble together elements of Wells’s novels and other works and focus on the spectacular growth of monsters, to more complex stories, represented in this chapter by John Taine’s *Seeds of Life* (1931), which foreground issues of reproduction and gender.

In Chapter Two, I examine how the pulp fascination with radiation and weaponry narrows to an almost single-minded focus on the atomic bomb and nuclear. For a time, the toxic narrative in SF is presented as a threat which has an appealingly clear source and compelling

narrative arc, often drawing on the genre tradition of post-apocalyptic “Adam and Eve” and “last man” stories. Stuart Cloete’s 1946 short story “The Blast” sets many of the norms for the “atomic holocaust” SF narratives that would proliferate during the Cold War. Pat Frank’s *Mr Adam* (1946) presents a sanitized version of nuclear peril that minimizes its dangers. Other texts, including Philip Wylie’s pro-Civil-Defense jeremiads, engage with the real and imagined specters of nuclear radiation. I close the chapter with readings of Judith Merrill’s “That Only a Mother Could Love” (1948) and *Shadow on the Hearth* (1950), which create a specifically feminist version of the science fictional toxic narrative, highlighting a previously marginalized perspective on the personal costs of large-scale techno-scientific advances.

In Chapter Three, I discuss the role of Rachel Carson’s *Silent Spring* as a crucial cultural and rhetorical moment in the trajectory of the toxic narrative in SF. Carson herself employs science fiction’s characteristic conventions and tropes in *Silent Spring*, and the widespread public attention her book brought to the dangers of pesticides and contaminants in turn led to new directions in science fiction. The work of Philip Wylie provides a perfect example of this generic shift from atomic to chemical dread: over the course of two decades, his novels move from the almost propagandistic pro-Civil-Defense of *Tomorrow!* (1954) to the apocalyptic pollution of *The End of the Dream* (1972). Brian Aldiss’s *Greybeard* (1964) is examined as a similarly transitional narrative between militaristic Cold War SF and more Carsonian SF. Theodore Thomas and Kate Wilhelm’s *The Clone* (1972) then provides a superb example of a straight-forwardly Carsonian SF text. Finally, I examine Richard Powers’s *Gain* (1998) in order to demonstrate how Carson’s SF-inflected rhetoric informs more mainstream toxic fiction.

Chapter Four examines texts that push back against the alarmist toxic narrative. Pat Frank’s *Alas, Babylon* (1959) and Kate Wilhem’s *Where Late the Sweet Birds Sang* (1976) both

cautiously explore the possibility of pastoral or wilderness salvation in response to environmental collapse. In popular culture, the comic book trope of super-powers gained through toxic exposure serves as a powerful reaction against the more common narrative of vulnerability and powerlessness. I read a representative sample of comics centered around the D.C. character Poison Ivy as an especially potent example of this theme; Ivy is a modern-day poison-maiden, in whom passivity has been replaced by an overt “taking back” of science from exploitative male practitioners. Finally, *The Children of Men* by P.D. James (1992) imagines a near-future threatened by mass infertility, and yet ultimately regenerated by religious faith.

The texts in this chapter largely reject the self-perpetuating myth of technoscience, which holds that problems created by science can be solved with more science. In their emphasis on inevitable mistakes and escapes, these depictions of toxicity resist isolating the toxic threat in singular bodies or locations. *The Food of the Gods* and its successors urge “a focus not on containment but on permeability, not on boundaries but on processes of dissemination” (Squier *Liminal Lives* 144). Especially now that genetic, reproductive, and agricultural technologies have made the lines of separation between “natural” and “artificial” growth more blurred and contested than ever, we can draw from these novels an important counter-narrative to the triumphal story of scientific progress; the toxic narrative in SF is increasingly, in Ursula K. Le Guin’s words, “full of spaceships that get stuck, missions that fail, and people who don’t understand” (153). This counter-narrative is, of course, present in even the earliest works of science fiction, but the particular way in which these novels deploy it to make the mundane monstrous speaks to a growing awareness of the dangers lurking in plain sight.

Indeed, as Chapter 5 will show, contemporary novels continue to be suspicious of scientific tinkering with the building blocks of life. The peril, however, no longer necessarily

takes the form of fertilizers or pesticides; the language of the toxic narrative echoes in the rhetoric of “Frankenfoods” and “gene pollution” deployed in opposition to genetically modified food crops. I conclude my dissertation with an examination of this rhetorical turn in recent SF and “slipstream” novels, including Paolo Bacigalupi’s *Windup Girl* (2009), Ruth Ozeki’s *All Over Creation* (2003), and Rob Ziegler’s *Seed* (2012).

In the process of tracing the development of the toxic narrative in SF, I have identified several thematic threads that run throughout the texts examined in this dissertation. First, many of these narratives center on a search for physical spaces that remain untouched by toxic encroachments, or in which toxicity is somehow rendered “safe.” This search typically ends in disappointment. Second, the more general ambivalence of toxic discourse is rendered in SF as an explicit conflict between distrust of and fascination with technology, often embodied in the form of the scientists who create and wield that technology. Finally, the toxic narrative displays a deep fascination with the permeability of bodies. This permeability is frequently dramatized through depictions of gender and reproductive failures resulting from toxic exposure.

In “Toxic Discourse,” Lawrence Buell writes that “theories that locate the origin of global toxification rhetoric in the Cold War or nuclear era cannot account for the age and complexity of the rhetoric” (652). The study of science fiction is, I argue, one crucial direction for understanding the development of an increasingly complex and culturally pervasive awareness of toxic exposure. By identifying and acknowledging the history and conceptual potency of toxic discourse as it appears in SF narratives, this study provides both historical and literary context for continuing debates about pollution and toxic exposure.

CHAPTER ONE

FOUNDATIONS OF THE TOXIC NARRATIVE

One of the central arguments of this dissertation is that the toxic narrative and science fiction share a great deal of common ancestry, and that the conventions of both are thus more alike than dissimilar. To that end, this chapter discusses the early days of SF, tracing the transition from allegorical and mythic structures and tropes to those we now recognize as distinctly science fictional. Beginning with a brief discussion of genre nomenclature, I analyze several representative texts from three eras of early SF: two proto-science-fictional “romances” by Nathaniel Hawthorne and Oliver Wendell Holmes Jr; two Victorian “scientific romances” by Robert Barr and H.G. Wells; and a selection of short stories from *Amazing Stories*, the first publication exclusively devoted to science fiction, concluding with John Taine’s novella-length *Seeds of Life* (1931). These tales of mad (or at least irresponsible and blundering) scientists, victimized bodies, and the uncontrollable effects of novel technologies vividly illustrate the foundations of the toxic narrative, particularly in their depictions of chemicals, which shift from botanical poisons and quasi-magical forces to techno-scientific artifacts.

Although the perception of science fiction as a distinct and easily identifiable genre is largely a product of the past hundred years, modern scholars commonly date the origins of what we now call science fiction from the publication of Mary Shelley’s *Frankenstein* in 1818; the novel, along with Shelley’s lesser-known *The Last Man* (1826) serve as formative templates for core SF narratives of artifacts run amok and elegiac disaster stories, respectively. There is, however, no formal consensus as to how far back one can retroactively designate texts as

“science fiction”; some scholars bring Homer’s *Odyssey*, Plato’s *Republic* and other Classical and Renaissance utopias and fantastic voyages under the generic umbrella. For most, however, the presence of technology in the narrative is the key prerequisite; in Brian Stableford’s useful definition, science fiction consists of works which display “an awareness of the roles played by science and technology in social change, and ... use that awareness as a subject matter, in order to explore its implications” (qtd Clareson 4).

Using this criterion, E.F. Bleiler’s *Science Fiction: The Early Years* lists sixty short stories and novels published from 1835 to 1863 that could be considered embryonic works of science fiction. During these years, no consensus term for science fiction emerges – the phrase “science fiction,” used specifically to denote a genre of scientifically-oriented fiction, did not become popular until influential editor Hugo Gernsback adopted it in 1929.⁸ Contemporary reviewers and publishers most often used the terms “romance of science” or “scientific romance” to describe these texts. According to Stableford’s *Scientific Romance in Britain, 1890-1950*, the earliest usage of the term “scientific romance” is thought to be in 1845, in reference to Robert Chambers’s speculative natural history *Vestiges of the Natural History of Creation* (1844); the use of the term became widespread following the popular success of the work of Jules Verne. Stableford argues that due to differences in publishing conditions (discussed later in this chapter), the scientific romance is a largely British phenomenon.⁹ The comparable American tradition is more inchoate, consisting mostly of the stylistically innovative work of Edgar Allan

⁸ Before this point, the term was often used interchangeably with “scientific novel,” a designation applied to books like Harriet Martineau’s *Illustrations of Political Economy* (1832) or Edwin Abbot’s *Flatland* (1884), which used fiction to dramatize abstract technical and scientific concepts.

⁹ In addition to Stableford’s book, the definitive scholarly work on the subject of the British scientific romance is Darko Suvin’s *Victorian Science Fiction in the UK: The Discourse of Knowledge and Power* (1983), which includes an annotated bibliography of 360 primary texts.

Poe (particularly his *The Narrative of Arthur Gordon Pym*) and some of the fiction of Nathaniel Hawthorne.

“Rappaccini’s Daughter”

Nathaniel Hawthorne’s “Rappaccini’s Daughter,” first published in 1844, is a foundational text for both subsequent science fiction and, more broadly, the literary depiction of science in the twentieth and twenty-first centuries. Although it contains strong elements of the Gothic, the romance, and moral allegory, this story is undoubtedly an early work of what would come to be called science fiction. Brian Atteberry has argued that Hawthorne crystallizes some of the central themes of the genre, including “men’s reduction of women to physical appearance; their denial of their own bodily existence and projection onto women of the body’s imperfections, and the male scientist’s resentment of and subversion of a nature perceived as powerfully female” (qtd Yaszek 2008, 185). Many of Hawthorne’s stories during the late 1830s and early 1840s explore similar themes.¹⁰ These include famous works such as “Dr. Heidegger’s Experiment” (1837) and “The Birthmark” (1843), and lesser-known stories such as the post-apocalyptic “The New Adam and Eve” (1843) and “The Artist of the Beautiful” (1843), the story of a mechanical butterfly whose creation costs its creator everything else in his life, and is crushed in an instant by a curious child. These stories are a crucial moment in the development of science fiction as a distinct genre, suggestive of Hawthorne’s decision to explore questions of morality in the context of science rather than political or religious allegory.

“Rappaccini’s Daughter” opens like a fairy tale; “very long ago” a handsome young student, Giovanni, comes to Padua and falls in love with a young woman he sees in the walled

¹⁰ For an early but comprehensive analysis of the role of science in Hawthorne’s fiction, see Elizabeth Hosmer’s *Science and Pseudo-Science in the Writings of Nathaniel Hawthorne* (1948).

garden beneath his window. He learns from his landlady that the beautiful woman is Beatrice, the daughter of the reclusive scientist Doctor Giacomo Rappaccini. After bribing his way into the garden through a hidden door, Giovanni quickly realizes that Beatrice possesses terrible powers; raised among the fantastically poisonous plants of her father's garden, she herself has become poisonous. Ultimately, Beatrice pays the price for her father's experiments; in despair, she swallows a powerful antidote provided by Giovanni, even though she knows that it will react lethally with her poisonous body. She dies at the feet of her would-be lover and her father.

The toxic female body has a long history in myth and literature, most often appearing as a threatening, malicious presence. In her book *Greek Fire, Poison Arrows, and Scorpion Bombs*, Adrienne Mayor writes that “the idea that certain persons were poisonous, capable of killing with their mere touch or breath” is a recurrent motif in the oral and written lore of many cultures (142). In Greco-Roman myth, the blood of Medusa was said to have fallen on the sands of Africa and generated poisonous serpents. The blood of the centaur Nessus was also poisonous; a robe soaked in it killed the demigod Hercules. Sanskrit literature shows a particular fascination with the poisonous female body. The *Katha Sarit Sagara*, a collection of Indian tales compiled by the poet Samadeva around AD 1050, tells of beautiful maidens carefully fed poisons until their mere touch became deadly. Indian kings dispatched these *visha kanya*, or poison maidens, as gifts to their enemies. Another account, the 7th Century historian Visakhadatta's ancient Indian political drama *Mudra-rakshas* (“The Minister's Seal”), describes an unsuccessful plot to assassinate King Chandragupta with a poison maiden. Over time, western European folklore assimilated this tale and gave it a historical character: the Indian king Porus sends Alexander the Great a poison maiden, and the assassination is prevented only by the swift action of Alexander's adviser Aristotle. This apocryphal version of the legend was popularized in the 17th century by Robert

Burton in his *Anatomy of Melancholy* (1652) and by Sir Thomas Browne's *Vulgar Errors* (1646). The persistence of this myth is noteworthy: the monstrous beauty of the poison maiden is essentially a projection of fascinated fear and hostility onto an archetypal female figure, one whose essential attraction is the seductiveness of invisible violation.

Although the poison maiden of Hawthorne's story does not appear until several pages into "Rappacini's Daughter," the divide between nature and artifice is immediately apparent in Rappaccini's lush garden. Giovanni, romantic and inclined to poetry, "rejoiced, that, in the heart of the barren city, he had the privilege of overlooking this spot of lovely and luxuriant vegetation. It would serve, he said to himself, as a symbolic language, to keep him in communion with Nature" (2291). In many of his works, Hawthorne draws on the rich symbolism of the garden as the mythic site of humanity's primal connection with nature.¹¹ Of course, in the Judeo-Christian tradition the garden is also the scene of the Edenic fall – the primal divorce from nature. It is, then, unsurprising that one of the earliest science fictional expressions of unease with biological tampering should be set in a richly allegorical garden.

However, for all of Giovanni's romanticism, a large part of the beauty of this garden is the extent to which it has been artfully arranged and cataloged. "Every portion of the soil was peopled with plants and herbs, which, if less beautiful, still bore tokens of assiduous care," he notes, "as if all had their individual virtues, known to the scientific mind that fostered them" (2289). The focal point of the walled garden is a marble fountain "sculptured with rare art, but so wofully shattered that it was impossible to trace the original design from the chaos of remaining fragments. The water, however, continued to gush and sparkle into the sunbeams as cheerfully as

¹¹ Most notably in his 1852 *A Wonder-Book for Girls and Boys*, which re-tells popular Greek myths in ways appropriate for children. A visiting college student, Eustace Bright, visits the garden home of twelve children, each named after an American wildflower. Salutory doses of botany and classical tales are dispensed in the context of the *hortus conclusus*, or inviolable garden.

ever” (2289). This fountain stands as a stark symbol of the impermanence of human artifice; the centerpiece of this carefully planned and tended garden is a rebuke to “design,” an aesthetic whole now shattered into fragmented chaos. It still serves its mechanical purpose, but it adds to the sense of the garden as an uncanny place, both mundane and unsettling. The garden’s juxtaposition of “assiduous care” and “wofully shattered” centerpiece foreshadows the behavior of its gardener. Giovanni observes from his window as Rappaccini, masked and gloved, makes his rounds among the poisonous plants:

Nothing could exceed the intentness with which this scientific gardener examined every shrub which grew in his path; it seemed as if he was looking into their inmost nature, making observations in regard to their creative essence, and discovering why one leaf grew in this shape, and another in that, and wherefore such and such flowers differed among themselves in hue and perfume. (2289)

Here, Rappaccini is introduced as the quintessential “scientific gardener,” a sort of Renaissance-Italian Gregor Mendel meticulously unraveling the secrets of the “creative essence” of plants. His gloves and mask, however, signal a profound disconnect from the physical and aesthetic enjoyment typically associated with gardening. In fact, Giovanni notes,

... in spite of the deep intelligence on his [Rappaccini’s] part, there was no approach to intimacy between himself and these vegetable existences. On the contrary, he avoided their actual touch, or the direct inhaling of their odors, with a caution that impressed Giovanni most disagreeably; for the man’s demeanor was that of one walking among malignant influences, such as savage beasts, or deadly

snakes, or evil spirits, which, should he allow them one moment of license, would wreak upon him some terrible fatality. (2289)

Rappaccini's lack of "intimacy" with the "vegetable existences" of his garden mark him immediately as a model of a problematic practice of science in which the quest for knowledge and the stance of ostensible objectivity shade into amorality. This scene conveys, in one striking image, the underlying antagonism between "culture" in the sense of the pleasantly pastoral aesthetics of a "person cultivating a garden, that most simple and innocent of human toils," and Rappaccini as the representative of the disciplinary "culture" of science: "a tall, emaciated, sallow, and sickly-looking man, dressed in a scholar's garb of black" (2290, 2289). Rappaccini has spent a lifetime cultivating the fantastically dangerous plants in his garden, and yet he proceeds not out of Giovanni's romantic desire for a garden which will keep him "connected to Nature," but solely to advance his theory that "all medicinal virtues are comprised within those substances which we term vegetable poisons" (2292).

His work becomes sinister when he begins to "improve" on naturally occurring poisons: he "is said even to have produced new varieties of poison, more horribly deleterious than Nature, without the assistance of this learned person, would ever have plagued the world withal" (2292). Yet Rappaccini also distills his garden's plants into powerful medicines, a benevolent use of virulence which even his scientific rival, Pietro Baglioni, is forced to admire. After grudgingly acknowledging the good done by the doctor's medicines, however, Baglioni tells Giovanni that Rappaccini "cares infinitely more for science than for mankind. His patients are interesting to him only as subjects for some new experiment. He would sacrifice human life, his own among the rest, or whatever else was dearest to him, for the sake of adding so much as a grain of mustard-seed to the great heap of his accumulated knowledge" (2292). Even without the

malignant motives of the mad scientist, Rappaccini lacks the empathy which would give his work meaning beyond the laboratory, or the sense of perspective necessary to avoid the scientific hubris so common in Hawthorne's scientific romances.

Hawthorne goes on to invoke once again the Edenic garden, and with it, the incipience of the Fall. Giovanni himself immediately recognizes the parallel between *this* garden and *the* Garden, and notes the ironic distance between them:

It was strangely frightful to the young man's imagination, to see this air of insecurity in a person cultivating a garden, that most simple and innocent of human toils, and which had been alike the joy and labor of the unfallen parents of the race. Was this garden, then, the Eden of the present world?--and this man, with such a perception of harm in what his own hands caused to grow, was he the Adam? (2289-90)

Rappaccini embodies the figure of the scientist as both omniscient creator-God and curious Adam, knowing perfectly well the consequences of plucking anything in the garden.¹² The plants themselves, upon closer inspection, seem to embody an affront to the proper division between nature and artifice:

...their gorgeousness seemed fierce, passionate, and even unnatural. Several, also, would have shocked a delicate instinct by an appearance of artificialness, indicating that there had been such commixture, and, as it were, adultery of

¹² For an allegorical analysis of "Rappaccini's Daughter," see Rosenberry's "Hawthorne's Allegory of Science." As in much mid-century scholarship on this story, Rosenberry reads Rappaccini as the story's central figure: the "allegorical incarnation as Scientist" who represents "an ironical but not otherwise distorted picture of science seen from the gloomiest point of view" (41, 40). Beatrice's central role is largely reduced to that of "a tragic Miranda" to Rappaccini's Prospero (43).

various vegetable species, that the production was no longer of God's making, but the monstrous offspring of man's depraved fancy, glowing with only an evil mockery of beauty. They were probably the result of experiment, which, in one or two cases, had succeeded in mingling plants individually lovely into a compound possessing the questionable and ominous character that distinguished the whole growth of the garden. (2297)

If Rappaccini's garden is, as Giovanni calls it, a "poisonous Eden" populated by "the monstrous offspring of man's depraved fancy," then the shimmering purple shrub that grows next to the shattered fountain is its Tree of Knowledge. This gorgeous shrub is the means of the doctor's ultimate violation of natural order: Baglioni angrily reveals to Giovanni that Rappaccini "was not restrained by natural affection from offering up his child... as the victim of his insane zeal for science" (2302). Even before he knows of Beatrice's poisonous nature, Giovanni notes the metaphoric correspondence between the girl and the lush plants of the garden. He first sees her "arrayed with as much richness of taste as the most splendid of the flowers, beautiful as the day, and with a bloom so deep and vivid that one shade more would have been too much" (2290). Beatrice happily tends the plants too lethal for even her gloved and masked father to approach. The unique connection between the beautiful woman and the poisonous flowers further obscures the line between the natural and the artificial, the human and the non-human:

Giovanni's fancy must have grown morbid, while he looked down into the garden; for the impression which the fair stranger made upon him was as if here were another flower, the human sister of those vegetable ones, as beautiful as they – more beautiful than the richest of them – but still to be touched only with a

glove, nor to be approached without a mask. ... Flower and maiden were different and yet the same, and fraught with some strange peril in either shape. (2290-91)

Giovanni quickly rejects this “morbid” interpretation of the garden scene: looking at the garden again the next day, “He was surprised, and a little ashamed, to find how real and matter-of-fact an affair it proved to be, in the first rays of the sun, which gilded the dew-drops that hung upon leaf and blossom, and, while giving a brighter beauty to each rare flower, brought everything within the limits of ordinary experience” (2291). Confronted by the possibility of a profound breach of the boundary between human and vegetal nature, Giovanni retreats into materialistic skepticism. As Roy Male points out, his ultimate failure is his “quite understandable but nonetheless unfortunate reliance upon his senses as the ultimate criterion of truth” (62). Anything outside “the limits of ordinary experience” is simply inconceivable; “must I believe all that I have seen with my own eyes?” he asks Beatrice at their next meeting, when “the recollection of former scenes made him shrink” (2298). He is, in effect, retreating from the cognitive estrangement of science fiction into the comforting familiarity of realism.

Beatrice herself asserts her own hybrid nature visually, through her clothing: when she re-appears in the garden, Giovanni again “observe[s], or imagine[s], an analogy between the beautiful girl and the gorgeous shrub that hung its gem-like flowers over the fountain; a resemblance which Beatrice seemed to have indulged a fantastic humor in heightening, both by the arrangement of her dress and the selection of its hues” (2293). Beatrice later reveals that her affection for the plant has quasi-mystical origins: “at the hour when I first drew breath, this plant sprang from the soil, the offspring of his [Rappaccini’s] science, of his intellect, while I was but his earthly child,” she confesses. “I grew up and blossomed with the plant, and was nourished with its breath. It was my sister, and I loved it with a human affection” (2304). Beatrice’s

toxicity enables her to tend, with love and “human affection,” the garden from which all other humans, and particularly her father, are barred. For her, as both poison and poisoner, the boundary between nature and culture has been so completely erased that even the most poisonous plant in Creation is cared for and loved as a sister.

In this Edenic system, the *hortus conclusus* of science, Giovanni is the meddling serpent rather than a chivalrous rescuer. Beatrice is perfectly content before Giovanni’s arrival: when Giovanni asks her how she has borne her seclusion, she answers, “Only of late have I known how hard it was... my heart was torpid, and therefore quiet” (2304). It is *his* fear, and his rejection of the permeability of his own body, which leads to her death. Professor Baglioni presses Giovanni to take a tiny phial of a powerful antidote, “distilled of blessed herbs,” to administer to Beatrice. “It is not yet too late for the rescue,” he informs Giovanni. “Possibly, we may even succeed in bringing back this miserable child within the limits of ordinary nature, from which her father’s madness has estranged her” (2302). This masculine fantasy of rescuing the victimized daughter of a mad scientist reduces Beatrice to the status of a “miserable child,” and minimizes the complexity of her existence; both Giovanni and Baglioni presuppose that the *pharmakon* can be recast solely as cure rather than as poison. Armed with this antidote for his next assignation with Beatrice, Giovanni takes a moment to congratulate himself on remaining “within the limits of ordinary nature”:

Before descending into the garden, Giovanni failed not to look at his figure in the mirror; a vanity to be expected in a beautiful young man, yet, as displaying itself at that troubled and feverish moment, the token of a certain shallowness of feeling and insincerity of character. ... “At least,” thought he, “her poison has not yet insinuated itself into my system. I am no flower to perish in her grasp!” (2303)

Not only is Giovanni cast as a vain adventurer whose love curdles at the first sign of difficulty, he also imagines that his masculinity is itself a form of antidote or inoculation to the dangers that Beatrice represents. Moments after congratulating himself on his imperviousness, he watches in horror as a bouquet wilts in his hand – an echo of his first hint of Beatrice’s toxic touch. His fear instantly, and characteristically, turns to misogynist rage that targets Beatrice rather than Rappaccini. Giovanni storms into the garden and berates Beatrice, addressing her as “poisonous thing”: “Thou hast done it! Thou hast blasted me! Thou hast filled my veins with poison! Thou hast made me as hateful, as ugly, as loathsome and deadly a creature as thyself – a world’s wonder of hideous monstrosity!” (2304). Rather than considering that his proximity to the poisonous garden is to blame for his condition, Giovanni instinctively projects onto Beatrice this violation of what Baglioni earlier called “the limits of ordinary nature.”

Unable to bear his newfound monstrosity and threatened by the transgressive science she embodies, Giovanni seizes on the submissive aspects of Beatrice’s femininity as a way to protect both himself and Beatrice from the infection of the poisonous garden. Beatrice, partially recovering from the shock of her lover’s vitriol, assures him, “Giovanni – believe it – though my body be nourished with poison, my spirit is God’s creature, and craves love as its daily food” (2305). Throughout the story, Hawthorne accentuates this dialectical interplay between Beatrice’s obedient, nurturing femininity and her deadly touch. Beatrice’s submissive femininity serves as evidence of her personal moral innocence, and is almost powerful enough to trump even the clearest empirical evidence of the danger she embodies. After witnessing flowers wither in her grasp and insects fall from the air after encountering her breath, Giovanni asks himself, “What is this being? – beautiful, shall I call her? – or inexpressibly terrible?” (2294). While he attempts to place her toxicity in clear opposition to her femininity, he is forced to acknowledge

that the relationship of these two aspects of her nature is much more complex; Beatrice's combination of poisonousness and femininity is "both/and," rather than "either/or." Perversely, Giovanni's lingering doubts make Beatrice more desirable:

Whether or no Beatrice possessed those terrible attributes – that fatal breath – the affinity with those so beautiful and deadly flowers – which were indicated by what Giovanni had witnessed, she had at least instilled a fierce and subtle poison into his system. It was not love, although her rich beauty was a madness to him; nor horror, even while he fancied her spirit to be imbued with the same baneful essence that seemed to pervade her physical frame; but a wild offspring of both love and horror that had each parent in it, and burned like one and shivered like the other. Giovanni knew not what to dread. (2295)

This "wild offspring of both love and horror" is the defining quality of Beatrice's monstrosity. She represents a violation of boundaries between not only human and plant, but science and nature, chemistry and spirituality, feminine passivity and masculine agency.

Her uncanny mixture of sexual allure, personal innocence, and lethality is a clear extension of the poison maiden of folklore. Hawthorne quotes Thomas Brown's *Vulgar Errors* (1646) in an 1839 notebook entry, so he was clearly familiar with one of the most popular sources for the Westernized version of the poison maiden; Professor Baglioni invokes the story of Alexander the Great's encounter with a poisonous woman in an attempt to warn Giovanni against pursuing Beatrice. Unlike these earlier poison maidens, however, Beatrice is not merely a powerless tool of political intrigue. During her first meetings with Giovanni, she denies rumors that she is a highly skilled botanist in her own right, "already qualified to fill a professor's chair":

“Do people say that I am skilled in my father’s science of plants? What a jest is there!” she laughs. “But pray, Signor, do not believe these stories about my science. Believe nothing of me save what you see with your own eyes” (2298). And yet she knows that Baglioni’s antidote must be lethal to her; she drinks it in a moment of clear-eyed despair, rather than naïve trust. She takes the phial, telling Giovanni “with a peculiar emphasis: ‘I will drink – but do thou await the result’” (2306).

In the story’s concluding paragraphs, even as the poisonous antidote works its way through his daughter, Rappaccini reframes Beatrice’s toxicity as a victory over feminine weakness. “Dost thou deem it misery to be endowed with marvellous gifts, against which no power nor strength could avail an enemy?” he asks her. “Misery, to be able to quell the mightiest with a breath? Misery, to be as terrible as thou art beautiful? Wouldst thou, then, have preferred the condition of a weak woman, exposed to all evil, and capable of none?” (2306). The central irony of the story, then, is that the father’s attempts to protect his daughter from “the condition of a weak woman” are undone by her love of an undeserving man. Rappaccini’s tragedy is his inability to predict the real human cost of his scientific obsession; his daughter is both an innocent casualty and a monstrous product of that science. His desire for knowledge and control takes the form of poisoning his daughter to make her “his.” Her toxic body holds the promise of immense power, but in the end she is a “poor victim of man’s ingenuity and of thwarted nature, and of the fatality that attends all such efforts of perverted wisdom” (2306). Beatrice simultaneously embodies two of the great tropes of the emerging science fiction genre: the tragic scientist’s daughter, and the tragically failed or escaped scientific experiment.¹³ Her passivity

¹³ There are also, of course, clear parallels here with the volatile relationship of the creation/child to the creator/scientist in Mary Shelley’s *Frankenstein*.

shattered, unable to live in the world of men or to remain secluded in her father's garden, Beatrice's final act is her one moment of agency and rebellion.

Elsie Venner

The figure of the powerful yet tragic poisonous woman reappears in Oliver Wendell Holmes Sr.'s *Elsie Venner: A Romance of Destiny* (1861).¹⁴ *Elsie Venner* was extremely popular, reprinted several times through the turn of the twentieth century and inspiring at least one stage play, but it is now largely forgotten. This is quite possibly a consequence of Holmes's dry, didactic style, in which plot points are buried in long digressions on theology, pedagogy, social mores, and physiognomy. The hook, however, remains irresistible: in an extension of the poison maiden myth, the beautiful and wealthy Elsie Venner, exposed to rattlesnake venom while still in the womb, possesses the mesmerizing eyes and venomous bite of that snake. When the story begins, handsome young schoolmaster Bernard Langdon arrives in Elsie's small New England village and is quickly drawn in by the local gossip about the young woman's dangerous magnetism. Elsie's infatuation with her new teacher both frightens and intrigues Langdon, who begins researching snakes, mesmerism, and legends of the "evil eye." Her small romantic gestures also earn him the enmity of Elsie's murderous cousin Dick, who has designs on the girl's inheritance. After Langdon rejects her advances, Elsie's health declines rapidly. During her illness, both her fiery passions and her strange mesmerism wane; in her final moments, Elsie manages, for the first time, to tell her father she loves him.

¹⁴ This novel originally appeared in serialized installments in *The Atlantic Monthly* between January 1860 and April 1861 as "The Professor's Story."

In a preface to one of the novel's many editions, Holmes expresses bewilderment at the popularity of what he intended to be a treatise on original sin. "The continued call for this story, which was not written for popularity, but with a very serious purpose," he writes, "has somewhat surprised and, I need not add, gratified me" (Preface, 1891). He goes on to state: "the only use of the story is to bring the dogma of inherited guilt and its consequences into a clearer point of view. But, after all, the tale must have proved readable as a story to account for the large number of editions which it has reached." He either refuses to acknowledge, or is strangely blind to, the psycho-sexual draw of his own creation, a fascination found in the dangerous "flashing diamonds" of Elsie's eyes. Elsie has all the un-feminine aggressiveness that Hawthorne's Beatrice lacks. Where Beatrice seeks refuge in a passive and submissive femininity, Elsie represents the dangerous allure of aggressive female sexuality. Her "temper was singular, her tastes were anomalous, her habits were lawless, her antipathies were many and intense, and she was liable to explosions of ungovernable anger" (146). She must strike, bite, and grasp to kill, rather than gently exuding perfumed poison through her caress or breath. Compared to Beatrice, who only dreams of enjoying a chaste and fleeting human connection, Elsie loves with a dangerous, possessive passion.

Holmes directly cites the classical roots of his poison girl: the narrator mentions the fable of Alexander the Great and the poison maiden, and another story "of a certain man bit by a serpent, who recovered of his bite, the snake dying therefrom. This man afterwards had a daughter whom venomous serpents could not harm, though she had a fatal power over them" (167).¹⁵ Befitting its focus on serpents and sin, the novel also alludes to the Garden of Eden several times. Holmes describes the terraced garden surrounding Elsie's home as "full of ante-

¹⁵ Norman Penser cites similar a belief, quoted in Major's *Greek Fire*, that the bite of one immune to snake poison is itself deadly.

natal reminiscences of a lost Paradise,” and Elsie has a childhood attraction to the Biblical story of the serpent in the garden (109). One of the local clergy remembers how he had sent her books from the Sunday school, and “she tore out the frontispiece of one of them, and kept it, and flung the book out of the window. It was a picture of Eve’s temptation; and he recollected her saying that Eve was a good woman, – and she’d have done just so, if she’d been there. A very sad child, very sad; bad from infancy” (192). Elsie is, against all proper teaching, drawn to the rebellion of the temptation rather than the obedience of the peaceable kingdom; she is defined by her wildness rather than the meticulously ordered nature of Beatrice’s walled garden, or any other re-creation of Eden.

Holmes employs the same central metaphors as Hawthorne in “Rappaccini’s Daughter”: Elsie’s toxicity is closely linked to her affinity with the natural world, and it both heightens and endangers her femininity.¹⁶ From early childhood, Elsie “was found sleeping in the open air under a tree, like a wild creature” (112). Her rooms have become “a kind of museum of objects,” filled with strange trophies of expeditions to wild places: stones, dried flowers, nests, rare eggs, “quaint monstrosities of vegetable growth, such as Nature delights in” (199). Elsie’s rambling and acquisitiveness alludes to the popular link between women and the natural world, so often depicted as animalistic and irrational; the earliest references to her poisonous body draw this connection between non-human nature and the female body. In the summer, “when the veins of the earth were hot and swollen, and the juices of all the poison-plants and the blood of all the creatures that feed upon them had grown thick and strong, ...the life of Elsie seemed fullest of its

¹⁶ Elsie also shares a trait with another Hawthorne heroine: like the doomed Georgiana in “The Birthmark,” Elsie has a birthmark kept hidden beneath a gold necklace, which is somehow linked to her poisonousness and disappears when she dies. Holmes claimed not to have been influenced by Nathaniel Hawthorne’s stories: “My story was well advanced before Hawthorne’s wonderful ‘Marble Faun,’ which might be thought to have furnished me with the hint of a mixed nature, – human, with an alien element, – was published or known to me. So that my poor heroine found her origin, not in fable or romance, but in a physiological conception fertilized by a theological dogma” (1891 Preface).

malign and restless instincts” (196). Her propensity to reveal her “malign and restless instincts” by way of clothing, jewelry, and décor further emphasizes the ways in which her monstrosity is linked to her femininity:

At this season, too, all her peculiar tastes in dress and ornament came out in a more striking way than at other times. She was never so superb as then, and never so threatening in her scowling beauty. The barred skirts she always fancied showed sharply beneath her diaphanous muslins; the diamonds often glittered on her breast as if for her own pleasure rather than to dazzle others; the asp-like bracelet hardly left her arm. (196)

Like Beatrice, however, the physical power granted Elsie by her poisonous body is incompatible with the feminine qualities traditionally valued in a patriarchal system. Her essentially female soul “made her a woman, with all a woman’s powers and longings,” while her poisonous blood “chilled all the currents of outlet for her emotions. It made her tearless and mute, when another woman would have wept and pleaded” (322). By this reckoning, “a woman’s powers” derive from her ability to “weep and plead”; Elsie’s power is then necessarily as un-womanly as it is threatening to patriarchal morality. In this depiction of the “warring principles” that define her nature, Elsie’s “deep instincts of womanhood were striving to grope their way to the surface of her being through all the alien influences which overlaid them” (292). Her aggression also shuts her out from reciprocated love, that “daily food” of Beatrice’s gentle spirit. The object of her frustrated affections, Bernard Langdon, confesses to his confidant:

I pity the poor girl; but, Doctor, I do not love her. I would risk my life for her, if it would do her any good, but it would be in cold blood. If her hand touches mine, it

is not a thrill of passion I feel running through me, but a very different emotion.

Oh, Doctor! there must be something in that creature's blood which has killed the humanity in her. (162)

From the perspective of the moralizing male narrator, Elsie's inability to inspire romantic love serves as the final sign of her lost humanity. In the novel's concluding chapters, her love for Langdon counteracts her body's "poisonous influence," but as her toxicity fades away, Elsie's life goes with it. Rejected by Langdon, she dies quietly of a broken heart – a proper, passive young lady at last, she uses her last breath to tell her father that she loves him.

If Holmes's stated intention of offering a meditation on the theological implications of original sin offers a justification for his uniformly negative portrayal of Elsie, the novel's popular success reveals a continuing fascination with poisonous female power. Like Beatrice, Elsie is still ultimately destroyed by an incompatibility between her "woman's soul" and the destructive power of her body, and dies after being rejected by a scholarly lover. Elsie is also symbolically and thematically linked to the Edenic myth. Elsie, however, breaks from the passive sentimentality of Hawthorne's heroine in her explicit connection to the *serpent* as well as to Eve. Elsie is always-already fallen, and her mesmeric power derives as much from her self-knowledge and worldliness as from her beauty and the poison in her veins. In this sense, the novel's allegory of poison maidens and original sin is an effort to contain the dangerous (and feminized) materialisms that we are able to imagine and explore in extra-realistic forms like science fiction. The fact that Holmes justifies his "Romance of Destiny" in the language of science – pre-natal exposure to a toxin – marks a shift from the intentional poisoning that traditionally created poison maidens. The idea that one might be exposed to and damaged by poisons even without

the action of a poisoner is an important modification to the toxic narrative; it raises the specter of the toxic woman as an agent rather than as a tool of patriarchal imperatives and desires.

“The Doom of London”

Around the time that Hawthorne and Holmes are writing their poison maiden stories, other writers are dramatizing toxicity in a different way, one that is amorphous rather than embodied, and decidedly not seductive. With the spread of the Industrial Revolution, large-scale industrial pollution, particularly smoke and smog, begin to emerge as significant threats to human health and to a perceived natural order founded on the assumptions and values of pre-industrial agricultural economies.¹⁷ These industrial anxieties famously appear in poetry (Blake’s “dark, Satanic Mills” in “Jerusalem”), novels, and journalistic exposes (including Rebecca Harding Davis’s *Life in the Iron Mills* and Dickens’s Coketown in *Hard Times*). Writers seized upon the coal-smoke London fogs in particular as a potent symbol of environmental and societal decline; their “terrifying images of ‘strangling’ smoke fog and biological or racial decline reinforced one another,” Bill Luckin writes, “generating an astonishing set of deeply pessimistic environmental discourses” (33). In late Victorian literature, the smog of London and other industrial regions assume the form of massive, even universal, toxic events that threaten the sociopolitical order and the very existence of humanity.

The British “scientific romance” was particularly well-suited to dramatizing the specter of the smog. In his definitive study on the scientific romance, Brian Stableford points out that a

¹⁷ For a detailed summary of the contemporary response to the great smoke fogs which periodically paralyzed London between the 1870s and the 1920s, see Bill Luckin’s “‘The Heart and Home of Horror’: The Great London Fogs of the Late Nineteenth Century” (Jan. 2003).

strong vein of contemplative misanthropy runs through this generic mode, “based in contempt and shame rather than hatred” (1985, 338). Scientific romance often displays a desire not only for a new world, but for new men who are mentally and spiritually equipped to live in it; this desire “intensified a preoccupation with the probable collapse of civilization and its possible transcendent renewal” (338). William Delisle Hay’s sensationalist *The Doom of the Great City* (1882) and M.P. Shiel’s *The Purple Cloud* (1901) are perhaps the best known of these misanthropic “fog thrillers.” Both chronicle societal and physical perversions in the wake of atmospheric apocalypse. “London,” Hay’s narrator reports even before the city is smothered by its own smoke, “was foul and rotten to the very base, and steeped in sin of every imaginable variety” (10). Pollution materializes the moral corruption of an industrialized society cut off from any hope of a return to a life-sustaining Nature. Shiel’s last-man protagonist goes mad after wandering through a similarly asphyxiated London, and then travels the globe burning down metropolises such as Paris, Constantinople, and San Francisco.

Robert Barr’s short story “The Doom of London” is a particularly grim example of the apocalyptic smog story. Best known today as the founder, publisher, and editor of the literary monthly magazine *The Idler*, Barr wrote dozens of novels and short stories, most of them pot-boilers about British nobility and exotic adventures. “The Doom of London,” published in the November 1892 issue of *The Idler*, is probably his best-known short story, and one of only a few he wrote which could be considered science fictional. Barr later claimed that he had been inspired by a conversation with a railway engineer, who had remarked that “if ever seven days of fog coincided with seven days without wind or rain, London would be suffocated” (Bradshaw

202).¹⁸ The story is framed as a letter sent to a magazine editor sometime in “that most brilliant epoch of the world’s history – the middle of the 20th century” (540). The unnamed author is writing in response to a fictional essay by an Oxford professor titled “Did the People of London Deserve their Fate?” The “celebrated” essay claims that “Londoners were so dull-witted and stupid, so incapable of improvement, so sodden in the vice of mere money-gathering, that nothing but their total extinction would have sufficed, and that, instead of being an appalling catastrophe, the doom of London was an unmixed blessing” (540). As a survivor of this “total extinction,” which occurred fifty years prior, the narrator wishes to demonstrate “that such writing is uncalled for, and that there is something to be said for the London of the 19th century” (541).

Before recounting, often in gruesome detail, his experience of the Doom, the narrator pauses “to say a few words about the alleged stupidity of the people of London in making no preparations for a disaster regarding which they had continual and ever-recurring warning” (541). He compares his former neighbors to the inhabitants of Pompeii, who were likewise “so accustomed to the eruptions of Vesuvius that they gave no thought to the possibility of their city being destroyed by a storm of ashes” (541). The source of London’s disaster – their Vesuvian “storm of ashes” – is the thick blanket of coal smoke that settles over the city every day. The “alleged stupidity” of the Londoners is, the narrator asserts, a completely understandable complacency; the city’s citizens have grown accustomed to the fogs’ being quickly dispersed by the sea winds traveling up and across the Thames estuary. “I doubt if anyone thought it

¹⁸ This origin story was, perhaps, defensive. After the publication of “The Doom of London” a friend sent Barr a copy of Hay’s *The Doom of the Great City*, which shared similarities with Barr’s story. In a 1905 issue of *The Idler*, Barr asserted that he had never read Hay’s work before that moment, and further pointed out that Hay’s victims died after inhaling poisonous particles trapped in the fog, while Barr’s were suffocated by the fog itself (Bradshaw 203).

possible,” he writes, “for a fog to become one vast smothering mattress pressed down upon a whole metropolis, extinguishing life” (541).

As in the larger toxic narrative, the danger of the final deadly London fog lies in its apparently mundane beginnings. The fogs “were merely looked upon as inconvenient annoyances,” and on the fatal morning, “The fog did not seem to have anything unusual about it. I have seen many worse fogs than that appeared to be” (544).¹⁹ Thick layers of coal smoke build up when the usual breezes fail to carry them off, and effectively trap London inside a gas chamber filled with carbon monoxide. The narrator, a clerk for a scientific apparatus company, is miraculously spared when a gas-mask-like machine is accidentally left switched on inside his office. With the aid of the device, he is able to make his way through the corpse-littered city to an underground railway station, where he manages to fight back a desperate mob of survivors, revive the locomotive’s engineer, and escape to the countryside.

Barr’s apocalyptic scenario trades heavily on the dramatic juxtaposition of a foul and polluted city to a clean and pastoral countryside. Barr was not alone in his anti-urban premise; many writers proposed radical rural and agrarian solutions to the poisonous miasma of industrial smog and coal-smoke fogs. Richard Jeffries’s *After London or Wild England* (1885) depicts an England depopulated by an obscure (but likely man-made) disaster returning to a quasi-medieval state of nature, while London itself reverts to uninhabitable swampland. Although the novel’s future-England is unpleasant and barbarous, it still informed William Morris’s utopian *News from Nowhere* (1890); in an 1885 letter, Morris writes that after reading *After London*, “absurd hopes curled around my heart” (qtd. J. Fowles).

¹⁹ This important point is somewhat undermined by *The Idler*’s accompanying watercolor illustration in the original printing of the story; the fog is depicted as a sinister anthropomorphic female figure emerging from a collection of smokestacks and chimney pots.

It is important to note that the toxic threat in “The Doom of London” is not the direct result of scientific experimentation, but rather the unforeseen side-effect of larger techno-scientific processes (in this case, the burning of bituminous coal to power engines and heat homes). “Scientific men have since showed that a simple mathematical calculation might have told us exactly when the last atom of oxygen would have been consumed,” Barr’s narrator acknowledges, “but it is easy to be wise after the event” (544). In one respect, Barr’s story suggests – in a manner similar to Hawthorne’s in “Rappaccini’s Daughter” – that scientific knowledge can never provide certainty or security. “Scientific men” cannot predict the effects of technologies, but only analyze them after the fact. For Barr, however, the consequences of techno-scientific hubris have metastasized far beyond the confines of the garden and include the power systems and energy outputs required to fuel an industrialized society.

H.G. Wells and *The Food of the Gods*

As Barr’s success with *The Idler* illustrated, the late 1880s and early 1890s saw a proliferation of “middlebrow” newspapers and magazines, all of which had pages to fill every month.²⁰ These publications provided fertile ground in which the scientific romance flourished. H.G. Wells, now considered one of the founding fathers of science fiction, began his writing career in these publications, authoring provocatively speculative short essays like “The Man of the Year Million” (1893). These stories were wildly imaginative, especially in contrast to the considerably more sober Francophone Vernian tradition of “earnest extrapolation” in scientific romance (Stableford *Anatomy of Wonder* 15). In his seminal *Metamorphoses of Science Fiction*,

²⁰ British publishing had traditionally been extremely divided into “high” and “low” markets; the closing of the “middlebrow gap” during this period is largely attributable to the near-universal literacy following the 1870 Education Act. For more on this historical moment, see Hoggart’s classic *The Uses of Literacy* (1957); for its impact on the development of SF, see Stableford’s *Scientific Romance in Britain 1890-1950* (1985).

Darko Suvin identifies Wells's work as a crucial turning point in the trajectory of the genre; "the central theme of much of his science fiction was the scientific pursuit of information likely to bring about unpredictable change and disorder" (Reed 340). A typical Wells tale menaced readers with "a frightening, destructive force challenging complacent bourgeois assumptions" (ibid). His characteristic style, themes, and subject matter profoundly influenced the generations of SF writers to come.

Wells himself, however, resisted distinctions between his "scientific romances" and his essays and fantasy, lumping them together as "Fantastic and Imaginative Romances" – to emphasize that (in the author's eyes, at least) the works' primary function "was to reconstruct moral expectations in the context of a modern worldview" – although his work is now recognized as foundational to the SF genre, "he was scathingly dismissive of them [scientific romances] precisely because he felt that in being relegated to genre status they had lost almost all their intended and potential impact as literary propaganda" (Stableford *Scientific Romance* 16, 17). In Wells's "sociobiological" scientific romances – as in the poison maiden stories or "The Doom of London" – societal and scientific forces manifest physically in a dramatic fashion.²¹ In the case of *The Food of the Gods*, this manifestation takes the form of uncontrollable, monstrous growth brought about by the scientific manipulation of reproductive biology.

Wells tangentially explores the idea of monstrous growth in his 1898 novel *The War of the Worlds*, when Martian invaders bring with them a highly invasive species of red vegetation. The narrator notes that several varieties of Martian plant life seem to have tagged along for the ride to Earth, but only this "red weed" adapts well to its new environment; the plant grows furiously, choking waterways and smothering native vegetation. The red weed is eventually

²¹ Darko Suvin uses the term "sociobiological" to describe Wells's fiction in *Metamorphoses*.

destroyed by the same terrestrial microbes that kill off the invaders themselves. The eradication of this alien monstrous growth is as unaffected by any human agency as was its introduction.

Monstrous growths which occur as the result of human tampering, however, are a threat on a much more fundamental level than invasive Martian weeds. They are, if anything, *more* alien because of their underlying familiarity – a living reproach to scientific hubris, a punishment for technical ineptitude, or both. Wells makes this his central subject in *The Food of the Gods and How It Came to Earth* (1904). Although giants appear in the earliest mythologies, *The Food of the Gods* is, to all intents and purposes, the progenitor of more than one hundred years of SF fascination with the idea of monstrous growth. Although the subtitle “*and How It Came to Earth*” hints at the idea of monstrous growth as *not* of this earth, Wells’s concern is wholly with the products of science rather than interplanetary invasion.

Professor Redwood, a fellow of the Royal Academy of Science, labors under an obsession with growth. Wells initially presents Redwood (and, by association, all scientists) as a satirical target: for years, he “had been measuring growing things of all sorts, kittens, puppies, sunflowers, mushrooms, bean plants and (until his wife put a stop to it) his baby,” publishing his findings as an interminably dull series of line graphs (Wells 6). The result of Redwood’s research is the determination “that apparently nothing grew regularly and steadily, and so far as he could make out nothing could grow regularly and steadily; it was as if every living thing had first to accumulate force to grow, grew with vigour only for a short time and then had to wait for a space before it could go on growing again” (6). After Mr. Bensington, an expert on “toxic alkaloids,” reads Redwood’s paper, he realizes that one might “oil the engine from without” and do away with the “resting phase” of growth. Together, the two scientists concoct the formula for “Herakleophorbia,” a powdered compound which they primarily hope will win them prestige and

fund their future research, but might also have some use in the way of ending world hunger. In a fit of grandiosity, Bensington refers to their breakthrough as “the Food of the Gods.”

On the night of their discovery, an uneasy Bensington “dreamt he had dug a deep hole into the earth and poured in tons and tons of the Food of the Gods and the earth was swelling and swelling, and all the boundaries of the countries were bursting, and the Royal Geographical Society was all at work like one mighty guild of tailors letting out the equator” (8). Bensington’s dream of a monstrously engorged earth metaphorically links the extravagance of the growth initiated by the Food of the Gods to “other types of morphological, governmental, and libidinal excess”—the fundamental violence of their invention effectively ripples out to every aspect of culture (Squier *Liminal Lives* 121). Redwood dreams only of charts filled with pleasantly vertical lines.

Wells’s tale rapidly moves from a comic skewering of the scientists themselves to a horror story of scientific hubris and mismanagement. Bensington locates a run-down farm in Kent where the partners can test the Food on some unfortunate baby chickens. In an allusion to the *Frankenstein*-ian association of the Gothic with scientific hubris, Wells paints the “Experimental Farm” as the essence of Gothic menace, writ small:

It was a queer little isolated place, in a dell surrounded by old pine woods that were black and forbidding at night. A humped shoulder of down cut it off from the sunset, and a gaunt well with a shattered penthouse dwarfed the dwelling. The little house was creeperless, several windows were broken, and the cart shed had a black shadow at midday. It was a mile and a half from the end house of the village, and its loneliness was very doubtfully relieved by an ambiguous family of echoes. The place

impressed Bensington as being eminently adapted to the requirements of scientific research. (12)

Bensington hires the most irresponsible caretakers imaginable, who mismanage the first successful flock of giant chickens, leave Herakleophorbia containers open to wasps and rats, and spill the stuff on the roots of plants. The experiment ends as the Kentish countryside erupts in nightmarish battles with giant vermin; in the chaos, the caretaker's wife absconds with the Food and feeds it to her grandson. Another scientist, brought on board to promote the new substance as a "Boomfood" for infants, epitomizes the irresponsible attitudes that clearly scandalize Wells. "These accidents," he replies when Bensington expresses concern regarding the dangers of further escapes, "are nothing. Nothing. The discovery is everything. Properly developed, suitably handled, sanely controlled, we have – we have something very portentous indeed in this food of ours" (25). The giant rats, flies, and nettles are seemingly still an acceptable price to pay for the marvels of advancing science.

What follows is effectively an environmental history of the Food: "henceforth," Wells writes, "our whole story is one of dissemination" (93). The "bigness" spreads over the course of twenty years, as the Food resists all attempts to eradicate it; scientists, engineers, and armed posses with "all the best intentions in the world could not stop further leakages and still further leakages"; they are all ultimately helpless to maintain or restore the pre-Food status quo (93). While the monstrous growth of organisms affected by it is dramatic and impossible to ignore, the mechanism by which the Food itself is disseminated remains terrifyingly unseen and unstoppable. It seems to possess an almost conscious agency, "the pertinacity of a thing alive":

Always it worked slowly, by indirect courses and against resistance. It was bigness insurgent. In spite of prejudice, in spite of law and regulation, in spite of all that obstinate conservatism that lies at the base of the formal order of mankind, the Food of the Gods, once it had been set going, pursued its subtle and invincible progress (93).

This “subtle and invincible progress” echoes the very complexity, invisibility, and pervasiveness which define contemporary discourses of toxicity.²² The “bigness” ignores political and geographic boundaries, as well as the “Anti-Bigness Leagues” legislating and proselytizing against it in England and eventually globally. Wells’s novel is less concerned with the heroics of turning back the Food than with the invisible power of its spread.

If the fascination with monstrous growth lies in its vigor and perverse familiarity, the horror lies primarily in the monsters’ proximity to civilization, and even their portrayal as an extension of civilization itself. As it spreads, the Food of the Gods produces, in Susan Squier’s words, “not just biological but societal anomaly” (*Liminal Lives* 122). For many years, “The Food had been at first for the great mass of mankind a distant marvel” – over time, however, its effects spread:

it was coming home to every threshold, and threatening, pressing against and distorting the whole order of life. It blocked this, it overturned that; it changed natural products, and by changing natural products it stopped employments and threw men out of work by the hundred thousands; it

²² For a thorough discussion of Wells’s understanding and representation of ecology, see Arwen Spicer’s “An Ecological Ideology: The Specter of an Ecological Discourse in *The Food of the Gods*” in *The Undying Fire* 1 (2002): 65-75.

swept over boundaries and turned the world of trade into a world of
cataclysms: no wonder mankind hated it. (Wells 134)

Most distressing of all, the infants fed on “Boomfood” are now reaching adulthood. Until this point, “it did not seem to occur to the public mind that the growing little band of babies now being fed on the food would presently be growing more ‘up’ than most of us ever grow” (63). The “Children of the Food” appear in every country and every social class. Redwood’s son, now grown to suit his name, and the three sons of the hero-engineer Mr. Cossar represent the professional elite. The caretaker’s working-class grandson, Caddles, toils as a laborer in a quarry, shackled by his obedience to the petty tyranny of the parish vicar and the local gentry. Even rumors of a giant Continental princess are eventually revealed to be true after she escapes to England to pursue a romance with young Redwood.

It is ultimately this romance, which holds the potential to create an entirely new race of giants, that pitches the Anti-Bigness forces into outright war. Wells writes that

since it is easier to hate animate than inanimate things, animals more than plants, and one's fellow-men more completely than any animals, the fear and trouble engendered by giant nettles and six-foot grass blades, awful insects and tiger-like vermin, grew all into one great power of detestation that aimed itself with a simple directness at that scattered band of great human beings. (134)

For the “natural” majority of humanity, even the footprints of the Children of the Food represent the desecration of all “the order and decency the world of men has made” (138).

The social and political antagonisms of early twentieth-century society are parodied grimly and satirically in this increasingly literal conflict, as the novella abruptly shifts into a propagandistic mode in which Wells clearly takes the side of “bigness.” The Children of the Food are avatars of the positive aspects of growth, rather than monsters: Cossar’s engineer sons plan grand public works that only giants are capable of carrying out, only to be dismissed by petty bureaucrats. The simple-minded giant Caddles finally questions his status as the slave of gentry, and breaks free from his quarry. He is gunned down in the road, and shortly thereafter the British army begins to lob artillery shells at the Children’s fortified shelter. The novel ends with the Children embattled but optimistic, gazing toward the stars and dreaming of a “greater” future for humanity. The Children represent, to use a term coined by J.R.R. Tolkien regarding the fantasy genre, a “eucatastrophe” of science: they are good in themselves, not merely as a happy ending that redeems of an otherwise flawed and short-sighted scientific blunder. Their creation is a “good catastrophe,” like the horrifying lab accidents that produce superheroes later in the genre.

The Rise of the Pulps

As the twentieth century began, magazine editors, especially at middlebrow publications, shifted away from romances of all types and toward newly popular genres (particularly detective stories), hoping to appeal to a broader audience. There was, however, still an audience for stories of heroic and mad scientists and spectacular adventures with fantastic technologies and settings. In the US, so-called “pulp magazines” devoted specifically to what early editor Hugo Gernsback

initially called “scienti-fiction” both responded to and helped build this demand.²³ The pulps were dominated by fast-moving action and adventure stories. The primary style of American pulp fantasy was, Brian Stableford writes in *Anatomy of Wonder*, neither Vernian nor Wellsian, but Burroughsian.²⁴ Pulp narratives were concerned far more with “the sheer exuberance of invention” rather than sober extrapolation or didacticism to the “gradual exclusion of the more serious inclinations of British scientific romance” (22).²⁵ Despite their increasingly disparate style, these pulp writers still drew heavily on the work of earlier authors of scientific romances.

While *The Food of the Gods* is one of H.G. Wells’s lesser-known works today, it spawned a legion of imitators in the pages of early SF pulp magazines. These pastiches largely ignore the utopian optimism of the original in favor of shock value and heroic derring-do. Curt Siodmak’s “The Eggs of Lake Tanganyaki” appeared in the 1926 first volume of Hugo Gernsback’s *Amazing Stories* (alongside a late-period Wells short story so risible that Gernsback felt the need to assure readers that Wells truly had authored it). Siodmak’s tale of monstrous African tsetse flies hatching out of eggs, smuggled into Berlin and subsequently forgotten about by a Professor Meyer-Maier, is closer to Wells’s satirical mood than his socially progressive one. The scientific community is burlesqued as both absent-minded and hysterical; Meyer-Maier’s colleague Professor Schmidt-Schmitt concludes his report of a giant fly’s attack on a cart horse by breathlessly declaring the event “a world catastrophe” (348). Meyer-Maier himself faints

²³ For an overview of the history and influence of the early pulp magazines, see Ron Goulart’s widely cited *Cheap Thrills: The Amazing! Thrilling! Astonishing! History of Pulp Fiction*, (1972, re-issued with additional material in 2007) and Mike Ashley’s *The Machines: The Story of the Science Fiction Pulp Magazines* (2001). Interestingly, scientific romance almost disappears in Britain after WWI; the decline of magazine serialization and the rise of cheap paperbacks (whose publishers generally considered science fiction too “esoteric”) led most British genre authors to publish in the more lucrative new American pulps.

²⁴ “Burroughsian” here refers to the popularity of Edgar Rice Burroughs’s “Barsoom” (Mars) novels rather than his *Tarzan* series. For more on Burroughs, see Robert Markley’s *Dying Planet: Mars in Science and the Imagination* (2005).

²⁵ Stableford also points to the American-based pulps as a crucial break in the development of the genre, during and after which the US “becomes the forefront of innovation and diversification in imaginative fiction – a position it has retained ever since” (*Anatomy of Wonder* 20).

from excitement several times in the course of the four-page story, and spends two weeks during the height of the insects' rampage recuperating in a friend's sanatorium.

The flies are eventually defeated by the most advanced military technologies available in 1926: electrocution, poison gas, airplanes equipped with bombs, and heavy artillery divisions. Meyer-Maier receives the news of their destruction and immediately crawls into bed. "It is well that there is a supreme wisdom which controls the laws of nature," he thinks. "'Otherwise, the world would be subject to the strangest surprises.' He thought of the monsters and crept anxiously under the bed-clothes" (384). The scientists in Siodmak's story are not merely bumbler, but cowardly ones; while Meyer-Maier does not directly create the plague of giant flies, he is certainly responsible for unleashing them on an unsuspecting Berlin, and entirely unprepared to manage the consequences of chauvinistic trophy-hunting conducted under the aegis of "scientific inquiry." As Wells does in *Food of the Gods*, Siodmak ridicules scientists who refuse to take responsibility for the consequences of their experiments – even when the response to the resulting monstrous growth can only, it seems, be violence and destruction on a grand scale.

In 1931, *Amazing Stories* published another *Food of the Gods* pastiche, this time a two-pager by Eugene Stowall entitled "The Giant Puffball."²⁶ Professor Hoff, a botanist at the University of North Carolina, discovers a chemical which can increase the rate of cell division "and at the same time increase the size of every cell" (429). He administers this chemical to a mushroom; sequestered at first in a greenhouse, the fungus's growth is unstoppable and quickly breaks loose. The maintenance staff try to keep back its advances with shovels, but the

²⁶ *Calvatia gigantea*, commonly known as the giant puffball, is a common mushroom throughout Europe and North America; under favorable conditions, it can grow to the size of a soccer ball.

mushroom's bulk pushes past their defenses and its mycelia undermine the entire campus.

Although "the Thing" eventually uses up all the nourishment in the soil and slows until it is "at the mercy of the authorities," danger still lurks in "the thread-like portions of the Monster left underground" (430).

The threat of monstrous growth in these early stories is at once comical and earnest. The mundane nature of the monsters – chickens, babies, flies, mushrooms – makes an entirely unwinking narrative difficult. Interestingly, once the monster or monsters have been established as a threat, this humor is often channeled into a burlesque of scientists and science itself. In the denouement of "The Giant Puffball," for example, the narrator reveals that Dr. Hoff could not even control the formula for his hypertrophic chemical, and "is not certain just what plants or animals can be made to regenerate from cells in which this chemical has been injected" (430). The power of the creations of science is dramatically – and potentially terrifyingly – out of proportion to the ability of scientists to control what they unleash.

While these Wellsian pulp pastiches focus almost solely on the spectacular growth of monsters, more complex pulp stories also emerge. Edward Bell, who wrote fiction under the pseudonym John M. Taine, was one of the most popular and widely admired early science fiction authors; his reputation as a respected professor of mathematics at the California Institute of Technology lent legitimacy to his writing. Taine's *Seeds of Life* was originally published in the Fall 1931 issue of *Amazing Stories Quarterly*, and reprinted in a fix-up novel version in 1951 by Fantasy Press. Taine's story reprises earlier British narratives of industrial hazard; the main action takes place in the research division of an electrical power plant in Seattle. Now, however, the threat is re-focused through one of the most common of the new pulp SF tropes: the fortunate lab accident, in which toxic exposures result in characters gaining superhuman powers. *Seeds of*

Life also breaks from the grand social agendas of Wellsian SF by foregrounding the more intimate threats that uncontrolled technology may represent to reproduction and gender.

Technological catastrophes have been a fixture of what we now call science fiction from the very beginnings of the form. Some of these early works even directly address reproductive fears: one of the first instances is Frederic Carrel's *Paul le Maistre* (1901), in which "Orientals" invade the West after releasing a sterility-inducing plague; Wright F. Moxley's *Red Snow* (1931) features a mysterious red precipitation which sterilizes every woman on Earth. From its earliest days and through to the mid-twentieth century, however, science fiction reserved its deepest fascination with one particular kind of pollution: radioactivity.²⁷ X-rays were discovered by Wilhelm Röntgen in 1895, followed in 1896 by Antoine Becquerel's discovery of atomic radiation.

Seeds of Life is the story of a pioneering theorist of electrical radiation, Dr. Crane, and his sulky laboratory assistant Niels Bork. One night, Bork attempts a drunken suicide/sabotage and accidentally exposes himself to a concentrated blast of radiation which somehow leaves him alive, but with his memory largely erased. The next morning, he awakens from his stupor to find himself transformed into a hyper-masculine superman. "Five hours before his body had been like a young boy's, smooth, white, and practically hairless," Bork muses. Now, his features are almost over-determinedly virile: his skin has tanned to the "rich brown hue" of an outdoorsman, while "his chest, arms and legs were covered by a thick growth of coarse black hair like a professional weight-lifter's" (Taine 23). In a blur, he fakes his own suicide and by the end of the morning has completely forgotten his pre-radiated life. Wandering Seattle in his new body, Bork re-christens himself "Miguel De Soto" after a brand of cigars advertised on the wall of a

²⁷ For an exhaustive discussion of the actual effects of radiation on human reproduction, see pgs 172-174 and footnotes 52-59 of Vassolo and Grech's "'Extravagant Fiction Today, Cold Fact Tomorrow'": in this chapter, I am less concerned with scientific plausibility than with the *perception* of a given technology or toxin as threatening.

restaurant. As a result of his exposure, De Soto gains scientific brilliance in addition to masculine physical perfection, mastering theoretical physics in a day and gaining control of a major scientific foundation within a week. De Soto's brilliance quickly curdles into madness and an obsession with mutation and the inevitability of imperfection.

De Soto becomes the rival of his former employer Dr. Crane, stealing his lab, his research funding, and even his one-time love interest, Alice. Crane is a prototypical egotistical scientist, dismissive of all warnings regarding the danger of his experiments. When, early in the story, Bork expresses qualms about the level of radiation to which they are exposing themselves, directly against the advice of a medical doctor, Crane "in his cocksure ignorance" replies, "All doctors are old women. What do the physiologists actually know about the effect of X-rays as hard as ours on human tissues?" (7). Unconvinced, Bork gets to the real source of his anxiety: "He said you will be sterilized for life," he mutters. "I'm not going to live the next twenty years like a rotten half-man." (7). Crane remains cavalier, advising Bork to "be a confirmed bachelor like me.... What's a family anyway but a lot of grief? Throw the next switch and forget the girl" (7).

Crane's advice to "throw the next switch and forget the girl" succinctly expresses a central and problematic relationship between masculinity and science (one which we have already seen in embryonic form in the exploitative gender dynamics of Hawthorne's scientific romances). Evelyn Fox Keller has done influential work on the prevalence of science fiction's dialectic of the hyper-masculine yet monastically a-sexual scientist, and that character's embodiment of "the historic conjunction of science and masculinity, and the equally historic disjunction between science and femininity" (*Reflections* 4). She ascribes this gendered bias to "the deeply rooted popular mythology that casts objectivity, reason, and mind as male, and

subjectivity, feeling, and nature as female” (7). This mindset, “the ideology of modern science,” reflects to the male scientist “an image of self as autonomous and objectified: ... severed from the outside world of other objects (animate as well as inanimate) and simultaneously from their own subjectivity” (70). Hawthorne’s Rappaccini is, perhaps, the foundational figure in this popular mythology of the autonomous and god-like scientist-creator, moving about his garden with “no approach to intimacy” between himself and his creations, and experimenting on his own daughter in his quest for scientific knowledge and power. In *The Seeds of Life*, the masculinist model of science reinforces the idea of the body of the male scientist as autonomous and impermeable, even as the actual practice of science threatens the scientist’s potency. De Soto’s exposure only makes him *more* masculine, while Crane cavalierly dismisses the danger of impotency by comparing more cautious doctors to old women.

Although radiation poisoning has given De Soto an enviably masculine body and scientific mind, the threat of a fundamental emasculation looms. De Soto’s newfound virility is juxtaposed to the toxic radiation’s sterilizing effects on the other inhabitants of the lab. On the night of Bork/De Soto’s attempted sabotage, Dr. Crane’s bathing water turns blood red. Shaken, Crane has a biologist colleague examine the water under a microscope; he discovers that the water is unnaturally sterile, “as if boiled and filtered through porcelain” (46). Intrigued by the startling effects of Crane’s “hard rays” on reproductive systems, the doctors obtain a hen, “the most motherly looking, clucking Buff Orpington on exhibit,” whose eggs and offspring they plan to use as test subjects. In another show of casual chauvinism, Crane doesn’t realize that Bertha the chicken can’t reproduce on her own; his laughing housekeeper has to point out that “You might get Bertha a husband, if you want her eggs to hatch” (56). De Soto acquires his own

supply of experimental “pets,” including guinea pigs and frogs, with the same intent of exposing them to Crane’s radiation and then breeding them.

Like Rappaccini, De Soto also decides to experiment on the woman in his life: he intentionally exposes his new bride, the sweetly feminine Alice, to the “dysgenic energy” of his newest device. Both scientists expose women to powerful toxins without their consent, but the contexts and results are starkly different. Rappaccini exposes his infant daughter to deadly poisons to save her from being merely “a weak and feeble woman,” and goes on to educate her in the use of the very poisons that alienate her from the rest of humanity. Although Beatrice learns to regret her compromised femininity and comes to a tragic end, she retains her own agency throughout the story. Even her suicide is made possible by her knowledge of her body’s chemistry. Alice is also a highly educated daughter of a famous scientist; unlike Beatrice, however, she is denied the knowledge and scientific perspective necessary to understand her own body. Taine makes a particular point of noting that Alice’s education has left her ignorant of even the most basic biology:

The subject was an unexplored romance to her, as it is to most young women who should know it – if they should know any science. At school and college had been fed the traditional slops of literature, economics, art and domestic science, with not one significant word of the one body of knowledge which women, above all others, should know. The vital functions of her own being were terra incognita to her.... (142)

Alice is a victim not only of her husband, but of a fantasy of masculine monopoly over technological scientific knowledge, reinforced by structurally antifeminist attitudes barring women from

studying science and instead teaching them only the “slops” of the humanities, art, and household management. Although her exposure to De Soto’s rays is clandestine and she lacks the training to understand her body on an intellectual level, she still senses that something important has happened. When her husband asks her if she feels well, Alice answers doubtfully: “I suppose so.... But I feel – oh, how can I express it? Changed” (115). Her inarticulate response echoes the traditional role of the female in the ideology of modern science; she is the site of instinct, intuition, and emotion rather than rational objectivity. When De Soto presses for specifics, “she added in a voice which he scarcely heard, ‘Defiled and degraded’” (115). Her exposure registers in her mind as a violation, an unnatural incursion by a hostile and disruptive force; lacking any scientific context or vocabulary, she can describe her experience only in the sexualized language one might use to describe a rape. Her pregnancy, which becomes apparent shortly after this episode, serves as a continuation of her “degradation” and victimization.

Taine closely links pregnancy to vulnerability and weakness. Alice’s fears regarding her husband’s sanity and her own safety make her listless and pale, but De Soto and the male doctors who examine her dismiss her as oversensitive, mentally weakened by the “delicate condition” of her pregnancy. De Soto’s impregnated and irradiated “pets” are kept in cages near the room where Alice is now confined to her bed. Their restlessness mirrors Alice’s: “Each seemed to sense in some mysterious way the nature of the unseemly jest which chance – or design – had played upon it, and each of the hapless creatures seemed to anticipating with an unnatural dread the miracle which was almost upon it. The natural rhythm of its vital functions had been violated” (111). The guinea pig is the first to give birth: in its cage, “the wretched mother cowered in unnatural fright, panting with terror,” horrified by “the four things to which she had given birth against her will” (111). Shaken by what he sees huddled in the cage’s corners, De

Soto kills the mother and offspring with chloroform and a shovel and comes within seconds of doing the same to his sleeping wife.

The “dysgenic radiation” that creates these monstrous offspring is also capable, in larger doses, of mutating the mothers themselves. The same rays to which De Soto exposes Alice produce a nightmare of monstrous fertility:

It was a toad, the size of a full grown man, hideously deformed without eyes, its gelatinous skin pitted and pocked with holes the size of a human fist from which dripped and trickled a constant shower of young. As they rolled helplessly over the concrete floor the lumps of spawn began to develop, to thrust out feeble legs, and to increase in bulk like the arithmetic of a nightmare. The huge misshapen brute collapsed and became a swarming lump of fecundity. (148)

Days earlier, after the guinea pig’s fatal parturition, De Soto comforted himself that his experimental frogs propagate from eggs, keeping any unnatural offspring hidden “to wait for outraged nature to reveal the unknown” (111). Looking at their eggs, he involuntarily “began feeling his muscles and running his fingers lightly over his skin to detect the incipient nodules. ‘Am I to go like the frogs,’ he muttered; ‘or are only germ cells affected? One or the other; but which?’” (111). Confronted now by this nightmare toad, “the size of a full grown man,” De Soto again responds with denial and violence. He kills the horrifying creature and its “lumps of spawn” with a blowtorch, and tells the only other witness, a swooning Alice, that she merely dreamed the event. Like Crane, De Soto remains dismissive of the real costs of reproductive harm, attributing Alice’s fears of herself becoming “a swarming lump of fecundity” to hysterical

exhaustion. As if he had retained some small memory of his life as Bork, he follows Crane's advice from the first pages of the story: "What's a family anyway but a lot of grief? Throw the next switch and forget the girl" (7).

The story's plot then shifts from an intimate character study to a grandiosely global scale; in characteristic SF style, a single lab accident is amplified into a wholesale extinction. As he descends into madness, De Soto makes plans to expose all humanity to his dysgenic rays. "He was not brutal; destruction would come in thirty years, swiftly, painlessly, mercifully, like the dawn," he tells himself. By using his rays to sterilize the entire human race, "He would save humanity from itself by wiping it out, painlessly, in an hour" (175). Then, tortured by the thought that he may have made his unborn child into a monster, De Soto alters his plan. To console his own monstrous offspring, he will use radiation not to sterilize humanity, but to create a world of equally monstrous children: his transmitters "would suffice to change the germ cells of every living human being permanently... the fruit of every union not yet consummated, for as long as the present generation lived, would be a race of carnivorous reptiles, possibly venomous" (173).²⁸ After a single generation of reptilian children, De Soto's devices are programmed to release a new dose of radiation which will completely sterilize the human race and "offer the solace of extinction." The threat of monstrous offspring is galvanizing:

The preservation of the species is a deeper instinct, even with the individual, than is the preservation of self. Bertha's fellow hens pecked her to death when their instincts taught them that she had betrayed the birds to the reptiles. Likewise,

²⁸ Here, Taine is representative of his era's larger fascination with radioactivity and mutation/degeneration, which would only become more pronounced in the following decades; I will return to this topic in greater detail in the following chapter.

when Crane ... spelled out the impending degeneration of the human race, instinct prevailed. (173)

When Crane discovers and reveals De Soto's plan, humanity rises up and smashes De Soto's machines before they can power up.

Unusually for science fiction of the pulp era, Taine depicts the marvels of techno-science as merely window dressing concealing its insidious anti-human threat.²⁹ De Soto is able to cover the earth with his array of irradiating inventions by marketing them as labor-saving conveniences, catering to a desire for cheap electricity and novel household gadgets. By installing his sleek machines in domestic living rooms and kitchens as well as factories and power plants, he makes them mundane. Only two elite scientists suspect De Soto's real intentions; their warnings, dismissed by the capitalists profiting from the inventions, don't manage to reach a mass audience until mere seconds before De Soto's worldwide electrical grid will be switched on.

The salvation of Earth's population comes too late for Alice, who dies giving birth to a monstrous reptilian son. Crane tells Alice's heartbroken father that she "had died naturally – as, indeed, she had. Nature, however, is hell" (172). In his final redemptory act, De Soto dies trying to protect his child; the last will and testament he writes in an attempt to enfranchise the inhuman infant serves as his confession. Crane notes that "The story of his own redemption by love, as his superb intellect rotted, is now a classic. Those who know it by heart may wonder why Alice was

²⁹ Unusual for American SF of this period, at any rate: in marked contrast to the pulps' technophilic exuberance, British SF of this period is deeply (and understandably, after the horrors of WWI) pessimistic regarding science. The difference may also be partially attributable to the powerful editorial influence of Hugo Gernsback: in a 1931 editorial, "Wonders of the Machine Age," he stated a policy of rejecting for publication any stories which "attributed the evils of the time to technology," and vowed to "reject propaganda of this sort which tends to inflame an unreasoning public against scientific progress" (qtd Seed 2001, 49).

not redeemed by love, as De Soto was” (178). De Soto is humanized, even valorized, by his love for his monster-son; Alice is merely destroyed by hers. Like Beatrice or any number of other fictional female victims of science, her essential femininity is fatally incompatible with the practices of technoscience. Long before her husband must take seriously the reproductive threat of his dysgenic rays, the female creatures around him – chickens, guinea pigs, and even his wife – are callously irretrievably sacrificed to his experiments.

To be sure, most pulp stories are “almost without exception, horribly bad fiction,” “barely readable today.” Still, “they paved the way for the development of more sophisticated variations on their basic themes: the relentlessness and profligacy of progressive change; humankind’s increasing dependence on mechanical technology; and the difficulty of negotiating sudden encounters with the unexpected and the alien” (Stableford *Anatomy of Wonder* 43). In *Seeds of Life*, John Taine dramatizes anxieties about the potential for reproductive harm hidden inside novel technologies; although it quickly descends into the pulpy camp of lizard babies and dueling hyper-masculine and celibate scientist-saviors, the depiction of the fears themselves are visceral and sincere.

In *Visions of the Land*, Michael Bryson describes the “centuries-old tension between benefitting from the tangible fruits of scientific research and fearing its unintended consequences,” going back to the earliest days of formal chemical and botanical research (176). In science fiction, this narrative typically begins with a scientist’s desire to ease suffering, end world hunger, or advance the understanding of natural forces. The research or breakthrough then goes awry, and humanity wages a pitched battle against the resulting monstrous organism or force. In all of the narratives examined in this chapter, humans are threatened by “unnatural”

organisms created by chemical inoculations or other scientific tampering. The resonance of this imaginative projection lies in the inability of science to predict or control the consequences of what its discoveries.

In these early science fictional toxic narratives, hopes and fears for scientific progress find expression in material toxins (poisons and venoms, smog, Boomfood, and radiation), in the toxic bodies of poison maidens and giants, and in scientists themselves from the God-like Rappaccini, to bumblers like Professor Meyer-Maier, to Bork/DeSoto, who is a bit of both. The narrative style shifts from allegorical and mythical romances to pulp pastiche, and the settings move from domestic gardens to factory towns to laboratories. Yet the imagery remains largely the same: passive female victims of egotistical scientists, men who are either unable or unwilling to predict the consequences of their experiments; the insidious infiltration of bodies and environments by invisible chemicals or radiation; and the physical and societal disorder that accompanies this infiltration. Soon, however, the toxic narrative in SF narrows to an almost single-minded focus on a novel toxic threat: the radioactive fallout of nuclear weaponry.

CHAPTER TWO

THE TOXIC NARRATIVE IN COLD WAR SF

The years immediately after World War II, and particularly the 1950s, are often regarded as the “Golden Age” of science fiction. Many major figures in the genre, including Isaac Asimov, Ray Bradbury, and Robert Heinlein, did much of their best work during this time; others who would become better known for their work in the 1960s, including Kurt Vonnegut Jr. and Philip K. Dick, also began publishing in the 1950s. Some of this growth was market-driven (particularly by the ubiquity of cheap paperbacks), but the technological arms race of the Cold War also lent the genre a new legitimacy. In 1970, Isaac Asimov asserted that “the dropping of the atomic bomb in 1945 made science fiction respectable” (93). The omnipresent threat of nuclear holocaust was the dominant factor in the SF imaginary from end of 1940s to the beginning of the 1990s. The fear of nuclear war also raised SF writers’ cultural status: from the moment the atomic bomb was dropped on Hiroshima, SF author and scholar James Gunn wrote in 1975, “thoughtful men and women recognized that they were living in a science fiction world” (174). Where rockets and ray-guns had previously been relegated to the fringes of genre fiction, post-war readers were suddenly reading regular updates on atomic weapons, orbiting satellites, jet aircraft, and radioactive fallout in their daily newspapers. SF increasingly seemed prophetic, rather than juvenile or escapist.

After the bombings of Hiroshima and Nagasaki on August 6 and 8, 1945, the United States enjoyed three years of technoscientific ascendancy until the Soviet Union detonated its first nuclear weapon in 1949. In the interim, the ideological and military tension between the US

and U.S.S.R. solidified into what became known as the Cold War. The phrase “Cold War” is often dated to a 1947 speech by Bernard Baruch. However, SF scholar David Seed notes that it had been used as early as October 1940 by George Orwell in his essay “You and the Atom Bomb”: Orwell predicts that super-states “at once unconquerable and in a permanent state of ‘cold war’ with its neighbors” (qtd Seed 1999 1). Through the peak Cold War years of 1946-64, the American public was extraordinarily interested in the minutiae of atomic weapons, nuclear stockpiles, and delivery systems. This interest “reflected nationalistic pride, fear of the Soviets, and fascination with the bombs and the mysteries of radioactivity rather than a concern about public health” – the so-called “missile gap” (the belief that the U.S.S.R. had more advanced weaponry than the U.S.) took precedence over almost any other consideration (Lutts 20). This early prioritization of military expediency explains why a majority of tests were carried out on American soil; the potential for fallout damage to people and livestock received some attention in the popular press, but only after the “Bravo” test of the U.S. superbomb in the Pacific on March 1, 1954 did the danger of fallout become widely known. Fallout from this test affected 28 Americans, 236 Marshall Islanders, and 23 fishermen on the Japanese tuna boat *Lucky Dragon* (one of whom died). The *Lucky Dragon*’s fish were sold into the market, and the subsequent panic temporarily devastated the tuna industry.

As this dissertation’s first chapter has shown, however, this fascination did not appear in a vacuum. Pre-existing SF traditions heavily inform Cold War fiction, from apocalyptic “Adam and Eve” and “last man” stories – such as Mary Shelley’s *The Last Man* (1826) and M.P. Shiel’s *The Purple Cloud* (1901) – to the pulps’ fascination with radiation, as seen in Taine’s *Seeds of Life*. Even nuclear weaponry has famous precedents in SF: Wells’s *The World Set Free* (1914) depicts the chain reaction of atomic weaponry and the “mutually assured destruction” model of

nuclear war.³⁰ In one of the more famous anecdotes in SF scholarship, pulp author Cleve Cartmill's description of a chain-reaction nuclear bomb in his 1944 story "Deadline" was so convincing that the FBI investigated him, suspecting a breach of security on the Manhattan Project. After Hiroshima, however, science fiction returned to these themes with renewed vigor, and quickly incorporated the dramatic new specter of the mushroom cloud; Murray Leinster (writing without his pseudonym as Will F. Jenkins) published one of the first post-war accounts of a nuclear blast, *The Murder of the USA*, in early 1946.³¹

In *Paranoia, the Bomb, and 1950s Science Fiction Films*, Cynthia Hendershot proposes that in the cultural imagination of nuclear power, science is both threat and savior; it represents the forces of purification and progress, and yet is constantly threatened by the contamination and degeneracy released by its technologies. As this chapter will show, this tension plays out not just as the spectacle of monstrous irradiated creatures and nuclear holocausts, but in the more personal and intimate sites of the human body. As in earlier toxic narratives, the toxic threat of radiation also manifests in social, reproductive, and environmental disruption, as well as in increasingly ambivalent representations of scientists. The SF response to the threats of nuclear war and fallout is, in fact, remarkably complex; in order to accommodate this thematic sophistication, this chapter occasionally deviates from strictly chronological organization. I begin with two texts published in 1946 – Stuart Cloete's "The Blast" and Pat Frank's *Mr Adam*; I then study four works by Philip Wylie and Judith Merrill, all published between 1948 and 1963, before devoting attention to a survey and analysis of British Cold-War SF.

³⁰ For a detailed history of this tradition, see Martha Bartter's *The Way to Ground Zero: The Atomic Bomb in American Science Fiction* (1988). For a broader study of the same theme, see David Dowling's *Fictions of Nuclear Disaster* (1987).

³¹ The story's plot (the hero solves the riddle of who has dropped 300 atomic bombs on US cities) was directed as much to the mystery as to the SF market.

“The Blast”

One of the earliest post-war Bomb stories, Stuart Cloete’s 1947 “The Blast,” is also an excellent representative example of the form. Published as a two-part serial in *Collier's Weekly*, on April 12 and April 19, 1947, the novelette recounts “The Great Disaster of October 5, 1947.” A nuclear attack on New York City is followed by the outbreak of World War III. Soon thereafter, a contagious fever wipes out the small remaining pockets of human life; this is possibly, the narrator speculates, the result of a “bacteriological war that attackers planned for us got completely out of control” (Cloete 59). The story is framed as the last testament of a nameless protagonist, a former novelist of South African descent.³² Although the narrator believes that Germany (“the enemy of Russia and American and England”) was responsible for the first blast, he ultimately decides that assigning blame is a futile exercise.

Twenty years have passed between the 1947 annihilation and the beginning of the narrator’s account. “It is, I think, the year 1967 now,” he writes. “I never bothered writing about it until today, because, thinking myself the only survivor, I could see little point in recording the events of the last twenty years” (12). Writing the history of the Blast seems futile; the 5th of October, 1947, “might be called the last real date in history. I was in the interesting position of having survived history, of being history itself” (12). Even having decided to set pencil to paper, however, the narrator repeatedly derails his account with digressions on his former publisher, his old apartment, even his long-dead pets. “It is interesting to me to see how I keep evading the issue, how I keep side-tracking myself in a kind of escape mechanism,” he admits. “Evidently I do not want to write about that time, about the terror of those days and the horror that followed them” (12). These digressions and the avoidance they represent mark an attempt at psychological

³² The narrator is, to an extent, a stand-in for Cloete, who was himself best known for his historical novels set in South Africa.

realism that is one of the strongest aspects of “The Blast”; the first-person narration invites the reader to identify with the inadequacy of traditional narrative forms in the face of the near-total destruction of the known world. Later, he writes that “This is not a story. It has no plot. It is a testament, a form of history, a literary curiosity written for myself as a form of justification, as a debt that I, the last man of the past, owe to an unborn future” (60). This tension between avoidance and obligation, and the narrator’s more general difficulty in writing “about that time,” is typical of nuclear fiction, which has, David Seed points out the central problem of describing an event that is completely outside of all human experience (1999, 109).

A 1984 special issue of *Diacritics*, the theoretical journal at Cornell, devoted an issue that was designed to herald a new school of post-structuralist analysis called “Nuclear Criticism.”³³ In it, Jacques Derrida argues that nuclear war has a “fabulous textuality,” since it can only exist “through what is said of it,” yet “can only be the signified referent, never the real referent (present or past) of a discourse or text” (23, qtd Seed 4).³⁴ In fact, as David Seed points out, SF Bomb stories confirm Derrida’s thesis about the unusually intangible nature of the nuclear subject “by showing again and again a collective suppression of the dreaded event which is often signaled pronominally quite simply as ‘it’” (ibid). In “The Blast,” the narrator engages in exactly this kind of linguistic, psychological, and conceptual “suppression”: during the detonation, he recalls being able only to sense “That it was *it* – the atomic bomb, the ‘new god’ that we had talked about for so long and whose name, like that of older gods, we feared to mention, calling it *it*. Saying: *It* can’t happen here; *it* can’t happen to us” (70). Words then fail him completely: “I cannot describe fully what I felt then,” he writes. “What we felt was without precedent” (70). If,

³³ See Ken Ruthven’s excellent 1993 account of the ultimately unsuccessful movement to establish Nuclear Criticism.

³⁴ Jean Baudillard’s similar discussion of the “hyperreality” of nuclear culture is discussed in Messmer 1988, 399-402.

as Derrida argues, the nuclear event can only exist “through what is said of it,” then the narrator’s insistence that he is unable to “describe fully” his experiences is evidence not merely a cognitive distance from trauma, but an attempt to erase the event itself from existence.

Very few SF authors attempt to depict an actual nuclear explosion; in “The Blast,” the narrator is in a windowless room at the time of the attack, and “cannot even remember the sound – an incredible, dull, slow explosion” (70). “The Blast,” then, is a kind of prototype of the plot and descriptive devices that recur in later nuclear fiction. The norm in these narratives has tended to be descriptions of its after-effects, which together might be called the iconography of nuclear holocaust: set by the images of the nuclear attacks on Japan, it includes the shadows of atomized bodies imprinted onto walls, eyes and body parts liquefied by heat, and jewelry and clothing fused to skin. Even in this grim context, the eschatology of nuclear fiction plots usually revolves around the possibility of survival: there must, after all, be at least one survivor left to narrate the end of civilization as we know it.

As the survivors of the initial attack in “The Blast” succumb to violence, starvation, and disease, the narrator is left alone in an increasingly bizarre Manhattan. In echoes of the monstrous growth in earlier toxic narratives, he must use his experience as a South African big-game hunter to fend off not only escaped zoo animals and wild dogs, but wildly mutated animals including “giant wolves as high as a horse” and “minks that attack cattle and suck their blood in a few minutes” (12). He has a deeply conflicted response to these creatures. Early in his account, he writes that “These animals... are quite natural – phenomena that science once predicted might arise through the effect of atomic fission on the genes and chromosomes”; later, however, he declares that “these monstrosities were not, even in the animal sense, respectable members of the natural world, but were crazy,” either mad with hunger or inherently deranged (12, 84). Much as

the narrator's entire account is an attempt to describe an indescribable event, his paradoxical descriptions of these mutated creatures – at once “quite natural” and “not... respectable members of the natural world” – is symptomatic of the narrator's more general difficulty in applying pre-cataclysmic constructions of “the natural world” to an environment now permeated by the “unnatural” forces of radiation.

The plant life of the island is also affected by the fallout. Although it was at first so radioactive that it glowed, “the soil and dirt later became almost incredibly fertile, so that no matter how much it is grazed down, this grass carpet now appears to be indestructible” (63). “Everything grows with great rapidity,” and the rubble of skyscrapers and apartment buildings is soon transformed into a lush patchwork of jungle and rolling pasture. As with the mutated animals, the narrator's relationship with the landscape is also conflicted; he writes that even in the midst of decay and destruction, “the scene from a hilltop or a ruin is of strange and almost incredible beauty” (63). These images of monstrous vegetative growth are particularly interesting in the context of earlier SF's depictions of toxicity and vegetation. In those earlier works, the “unnatural” growth served as a metaphor for unchecked societal and scientific progress; in contrast, this vigorous and apparently “indestructible” irradiated vegetation works as a sign of the disappearance of culture altogether. The radioactive mutation of plants transforms Manhattan, perhaps the most thoroughly urbanized of American landscapes, into a post-technological wilderness.

For many years, the narrator clings to the outward signs of civilization; even as he fights off tigers and mutant wolves, he takes up residence in a luxurious hotel and collects fine wines, works of art, and priceless furniture from the city's abandoned homes and museums. In the first pages of his account, he acknowledges the ambivalence of his position; he considers himself a

man of high culture, and yet his survival is almost completely dependent on his brute physical strength and his pre-war experiences as a hunter and outdoorsman in Africa. Western civilization as a whole is in a comparatively worse position: “Our technological back was broken; our civilization writhed like a wounded snake, unable to advance and incapable of retreat,” he writes. “We were too complex to return to simplicity” (13). Although the narrator consciously resists the atavism of a full “return to simplicity,” he eventually moves from his hotel suite and into a cave, and over the course of many years he transforms physically as well. As a side effect of his bout with a disease he calls the Red Death, his body is “covered in hair like a damn monkey”; combined with his long white beard, “I looked like Moses when he received the tablets,” he writes (76, 86). His white hair belies his astonishing good health and immense strength; when, in the narrative’s conclusion, a roaming tribe of American Indians from Oklahoma arrives in his territory he even has two beautiful young women competing for the privilege of marrying such a fine physical specimen.

To the narrator, the arrival of the Indians “completes my story of the end of the white man’s world” (87). He leaves behind the final remnants of his “civilized” life to ride south with the tribe’s scouts. In the closing lines of his history, he writes: “I can only say that I ride forward with optimism and can now laugh at the change of circumstance which hoisted my race on the petard of its own ingenuity and returned this great land to its original possessors” (87).³⁵ While “The Blast” does dwell on the horror and tragedy of nuclear apocalypse, on both the personal and global levels, its “last man” structure also valorizes heroic, individualistic masculinity. The

³⁵ Lest the ending be read as anachronistically progressive, it is worth noting that the narrator still considers himself superior to his new comrades: when the Indians want to use his heavy game rifles, he tells them “that this was white man’s magic and so strong that it had destroyed all the white men in the world except me, turning its forces against them in retribution for their own misuse of its powers” (87). One shoots anyway and the recoil breaks his collarbone. The two young women competing for his affections are also blonde-haired and blue-eyed, thus avoiding the distasteful implication of miscegenation.

radiation of the nuclear blast kills and mutates plants and animals, but appears to have no negative long-term effects on either the narrator or the younger generation of Indians; if anything, exposure to radiation renders the narrator more virile than ever. The narrator, more than seventy years old as he writes, attributes his amazing “agility and powers” not only to “the vicissitudes I have passed through having tempered and strengthened my muscles,” but to “the presence of so much radioactivity in the soil of the vicinity.” Radiation exposure, much as in *Seeds of Life*, may give as well as take away: “Once one has acquired some kind of immunity to its dangers,” the narrator muses, “one can perhaps benefit from its virtues.” (70). Radiation is fictionalized as being analogous to a disease; Cloete minimizes its novel threat by suggesting that one may develop immunity to radiation through exposure, in the same way that one may build up an immunity to a poison or a microbe. The story ultimately takes a simplistic, Darwinian approach to nuclear war, in which cleverness and brute masculinity trump the invisible threats of fallout, radiation, and disease.

Mr Adam

This retrenchment of masculinity in the face of nuclear threat plays out in other Cold War toxic narratives. Pat Frank, who would go on to write the famous post-nuclear-apocalypse *Alas, Babylon* in 1959, published the novel *Mr Adam* in 1946. The novel presents worldwide male sterility as a cosmic punishment for the scientific hubris of the Bomb: “If I were God,” one character opines, “and I were forced to pick a time to deprive the human race of the magic power of fertility and creation, I think that time would be now” (Frank 16). Reporter Stephen Smith is tipped off that no hospital in New York City has any scheduled births or obstetrician appointments after June 21, nine months to the day since the explosion of a nuclear testing

facility in Mississippi. The entire state was atomized, but Smith points out that “nobody really missed Mississippi” (24). His flippant tone mirrors the over-confident scientists – Smith refers to them as “atom-poppers” – who insist on the safety of their own experiments even in the face of the Mississippi disaster and the growing evidence of the sterility it has caused.

Smith initially attempts to rationalize the mysterious lack of hospital appointments as part of a larger rejection of scientific and medical authority in the wake of nuclear destruction: “The truth is that people have just got damned sick and tired of kowtowing to those sacred, omnipotent institutions, the hospitals, and have decided to have their babies at home” (12). However, he and his editor quickly discover that the absence of pregnancies extends worldwide. The ensuing public investigation reveals that “all men are sterilized without exception, while few if any women were affected” (27). The indefatigable American press turns up the one exception to this universal male impotence: in upstate New York, mild-mannered geologist Homer Adam produces a baby daughter with his wife Mary Ellen. As luck would have it, he was protected in deepest depths of a lead mine at the moment of the Mississippi detonation. A political tug-of-war immediately erupts over which government division “gets” Adam, culminating in the institution of the National Re-Fertilization Project (N.R.P.).

Apart from a single angry confrontation between Smith and one of the loathsome “atom-popper” physicists, Frank takes a light-hearted, comic line as the novel becomes a satire of bureaucratic bloat. “The creation of a new government agency is, in many respects, like bringing in a new oil field,” Smith explains. “With the creation of the N.R.P., ... it was as if gold had been discovered in California all over again” (67). Every level of government, from top military brass to the lowliest assistant clerk, engages in short-term opportunism, with characters seeking to advance their own careers at the expense of the survival of the human race. Almost to a man,

these bureaucrats would rather have humanity die out entirely than let a rival program or department director receive the credit for saving it. This dark comedy extends to the level of international Cold War politics – a game of nuclear brinksmanship with sperm rather than warheads. When the Soviet Union claims to have discovered its own “Adams” in Upper Siberia, the threat of “Red babies” is used as a justification for “militarizing” Adam. Smith finds himself in the unlikely role of Homer Adam’s lone advocate, fighting government red tape to get Adam in physical and psychological shape to start producing babies on a war-time scale.

The novel willfully ignores the psychological toll sudden and irreversible sterility would take on men. It is presented almost exclusively as an opportunity for smutty jokes and career advancement. In fact, the novel winks, *fertility* is the real burden. Smith’s wife Marge complains, “I know it sounds silly to you but I think it is a dirty trick on the part of the whole male population. For the rest of your lives you will be rabbiting around, smirking, all equipped with built-in contraceptives” (31). Smith does not contradict her view of things. Frank gleefully burlesques the “baby-crazy” women hounding their Congressmen for a chance to gestate an “Adam child.” Homer Adam’s homely appearance makes the situation even more comical: “Can you imagine,” Smith exclaims, “the whole world peopled with redheaded beanpoles, all looking exactly like Homer Adam!” (58). Frank’s comic tone exhibits a cultural blindness to the key difference between *masculinity* and *virility*. Adam is not physically emasculated by a nuclear blast, but has been rendered neuter in a more socially unbearable way: he is deprived of his reproductive agency, his body subjected to the official scrutiny and policing traditionally reserved for women. Official medical and government records of women’s pregnancies and parturitions, which in some nations have been maintained since the eighteenth century, lack any remotely similar male analogue; the control exercised over Adam’s fertility is historically and

culturally unprecedented.³⁶ Unable to cope with the burden of fertility and its attendant loss of agency, Adam sterilizes himself as an act of protest.

In the final chapter, a seaweed-based tonic Smith had initially dismissed as “snake oil” restores male potency and the political and scientific primacy of the United States. This ending shores up a fundamental faith in both science and masculinity; science may endanger masculinity in multiple ways, but it can also reinforce or restore it quickly and painlessly. As in “The Blast,” *Mr Adam* suggests a discussion of the connections among science, radiation, and masculinity, only to retreat into a shoring-up of traditional constructions of manhood through over-determined displays of machismo. While “The Blast” suggests that muscles and big game rifles will ultimately carry one through plagues and mutant attacks, it also acknowledges the psychological and physical hardships of survival; *Mr Adam* simply laughs away the dangers of radiation.

The rather naïve confidence of narratives like “The Blast” and *Mr Adam* quickly became almost unthinkable: *The New Yorker* devoted its entire August 31, 1946 issue to John Hersey’s thirty-thousand word article “Hiroshima.” In straightforward prose, Hersey grippingly recounts the stories of six survivors of the atomic bomb dropped on Hiroshima.³⁷ The horrifying effects of the blast – melted eyeballs, fused fingers and toes, the shadows of vaporized bodies etched onto walls – quickly became ubiquitous symbols of nuclear destruction. The article was almost immediately reprinted as a standalone book; radio networks in the U.S., Canada, and Great Britain pre-empted regular programming to broadcast unabridged readings of the text. The

³⁶ To this day, there is no government data on male infertility, even though anecdotal evidence from reproductive specialists strongly suggests that infertility affects men and women about equally. As of 2007, “married women who are actively trying to conceive and have failed for twelve months are the *only* people included in the official government category of ‘infertility’” (Mundy 351, emphasis original). After 1982, the category “impaired fecundity” was added to serve as a catch-all term for women of any age or marital status.

³⁷ *Hiroshima* is regarded as one of the earliest examples of “New Journalism,” which combines the narrative techniques of fiction to non-fiction reportage.

popularity of Hersey's account made the effects of fallout and radiation sickness common knowledge, and ushered in a new wave of SF "Bomb stories" that attempted to depict the true magnitude of a nuclear strike in a variety of ways.

Philip Wylie and the Cold War Jeremiad

While Cloete and Frank contextualize their nuclear narratives in terms of the militaristic masculinity familiar from the pulps, other authors took a more sociopolitical approach reminiscent of the scientific romances. Philip Wylie, a prolific author across an array of genres, perfected the "nuclear jeremiad" genre, which deploys doomsday scenarios to attack American materialism, hypocrisy, and complacency. Wylie was virulently opposed to Communism and fascism, and even during WWII his journalism and fiction railed against the "Red menace." His 1945 novel *The Paradise Crater*, which described a Nazi conspiracy to develop and use uranium-237 bombs, was published only months before the first successful atomic test at Alamogordo. The coincidence resulted in a temporary house arrest by federal agents who feared that Wylie had somehow received leaks from the Manhattan project. The imbroglio worked in Wylie's favor; from the end of the war until the mid-1950s, Wylie was actively involved with government nuclear policy in a range of areas. He was permitted to observe atomic bomb tests in Nevada, served as an advisor to the Chairman of the Special Committee on Atomic Energy, and worked as a consultant for the Federal Civil Defense Authority from 1949 to 1954.

Wylie's impatience with the perceived complacency and inertia of civil defense programs led him to write *Tomorrow!* in 1954. The novel centers on the atomic bombing of Green Prairie and River City, two fictional Midwestern cities on opposite sides of the same river. One has taken its civil defense program seriously and the other has shirked its moral and civic duties. The

early half of the novel reads rather like a soap opera, as Wylie depicts a cast of characters of such exaggerated villainy or nobility that their ultimate fates are in very little doubt. The Soviets bomb the two towns simultaneously, without warning. Echoing one of the central assumptions of both the Civil Defense Authority and early Bomb stories – that panicking mobs would cause more damage than the nuclear strike itself – Wylie spends final chapters of the novel on depictions of terror and mayhem.³⁸ In a dramatic break from earlier nuclear fiction, however, Wylie also unflinchingly describes the physical carnage of an atomic blast. He describes people being roasted alive, disemboweled by flying glass, and trying to run on the shattered stumps of their amputated legs. In one especially grisly scene, a stunned woman carries her dead baby; its intestines have erupted through its back, and she trips on them as she walks.

Ultimately, however, the novel is as militaristic as “The Blast.” In its denouement, the U.S. responds to Soviet demands for surrender by detonating hundreds of “dirty bombs” in the Baltic, rendering almost all of Eastern Europe uninhabitable for hundreds of years. “By this point,” David Seed writes, “Wylie has totally shifted the novel away from considerations of civil defense and survival on to apocalyptic ultimacy in America’s confrontation with the enemy” (1999, 22). Even to his contemporaries, Wylie’s preoccupation with this theme seemed to pander to, in the words of the editor of the *Bulletin of the Atomic Scientists*, “American smugness about being ultimately the inevitable victor” (ibid). While he stopped well short of criticizing the use of atomic weapons, Wylie insisted that the American public should know the ugly realities of nuclear war. Wylie reveled in the charge that he was an alarmist hawk, claiming, “I have done my best to create alarm about the Atom Bomb – a *certain kind* of alarm” (emphasis original, qtd Seed 1999, 15). He believed that an official attitude of false optimism led to potentially deadly

³⁸ See Chapter Two of Oakes’s *The Imaginary War: Civil Defense and American Cold War Culture* (1994) for more on the CDA’s focus on “the psychological problem.”

complacency; one of his proposals was a display of models and photographs of the injuries likely to result from a nuclear blast, including amputations and radiation burns, which would go on tour across the United States.³⁹

With the advent of the hydrogen bomb, however, Wylie recognized a weapon against which no civil defense program could hope to adequately prepare the American citizenry. He withdrew from civil defense work and by 1960 he was condemning his own earlier bellicosity. In his 1963 novel *Triumph*, a nuclear war between the U.S. and the U.S.S.R. ends in the total annihilation of both sides. Wylie is almost overwhelmingly pessimistic about the odds of survival in the event of such a war. Desperate suburbanites lay siege to fallout shelters; in one gruesome scene, the owner of a shelter mows down his neighbors with a machine gun and throws hand grenades into groups of children. This carnage is followed by the graphic gang-rape of a young woman left stranded in the streets. Eventually, the main characters, millionaires sequestered in a state-of-the-art shelter, are the only survivors in the entire Northern Hemisphere. Wylie makes his title a dark joke; the protagonist and a handful of others are rescued after two years by an Australian submarine and shipped away from an utterly unsalvageable country that will henceforth “have no name.” Almost no trace remains of the jingoism of Wylie’s earlier work; America is literally wiped from the map by the short-sighted actions of its government and military.

Although *Triumph!* is deeply critical of civil defense claims that even an H-bomb attack would be survivable with proper precautions, the fact that Wylie’s main characters do in fact survive and are rescued undercuts his message. Even though communities and countries may not

³⁹ Wylie’s work with the Civil Defense Authority is thoroughly documented in the archives of the Philip Wylie Collection at Princeton University, especially in “Civil Defense Suggestions” (Box 121, Folder 4).

be defensible as a whole, pockets of survivors will be able to carry on. He attacks hypocrisy and bureaucratic bloat of the military and the scientific community, while still at least partially reaffirming a dual cultural faith in the value of militarism and technoscience. A sufficiently advanced shelter can keep radiation at bay (even if such a shelter is out of the reach of all but the wealthiest Americans); although the American and Soviet armies level their respective nations, it is still a naval ship that rescues the central group of survivors.

Judith Merrill and the Nuclear Home Front

This dual faith is called into question much earlier, and much more subtly, in the work of Judith Merrill. Judith Merrill is the author most associated with post-war women's SF; a prominent member of the "Futurians" writers group, which included Frederick Pohl, Isaac Asimov, and Virginia Kidd, Merrill edited a variety of influential SF collections, including all twelve of the 1956-1967 volumes of *The Year's Best Science Fiction*.⁴⁰ In her first published short story, "That Only a Mother" (1948), Merrill explores the very aspect of the nuclear threat that Frank laughs away and Wylie buries in ghoulish body-horror: the domestic and psychological suffering resulting from the invisible threats of nuclear radiation. Merrill's story explores the (at that time) under-examined links between "the ostensibly private world of the American post-war home, the public world of industry, and the increasingly arcane realms of professional science and its cadre of influential 'experts'" (Hagood 1007).

Although they appear in mid-century science fiction most often as firmly non-scientific, non-expert supporting characters – usually love interests and/or damsels in distress – women

⁴⁰ For further discussion of Merrill's career and influence, as well an account of women's roles in the development of American science fiction during the early and mid-twentieth century see Justine Larbalestier's *The Battle of the Sexes in Science Fiction* (2002) and Yaszek's 2008 book *Galactic Suburbia*.

during the Cold War were urged to revise prevailing models of female domesticity to include the possibility of nuclear war. Perhaps the most famous of these messages is the “Grandma’s Pantry” Civil Defense Authority campaign. In addition to magazine advertisements and posters, the campaign included a radio program which repositioned the kitchen as an extension of the fallout shelter. In one transcript from a 1953 broadcast, a suave announcer reminds his presumably female listeners that it is important to have a “seven-day supply of food on hand” in case of a nuclear emergency; he then equates an A-bomb attack to the “unexpected disaster” of last-minute dinner guests. This almost Orwellian broadcast and others like it attempted, however clumsily, to “domesticate” nuclear attack, “reducing its threats to an inconvenience that could be met by a good stock of canned food or a sturdy basement” (Seed 1999, 53). In hauntingly stark contrast, Merrill’s “That Only a Mother” domesticates the nuclear narrative by shattering the apparent sanctity and safety of the suburban home, refusing to sanitize or minimize the enormous threat radiation represents to future generations.

Told primarily in epistolary form, “That Only a Mother” details the birth and early months of the first child of Margaret Marvell, an American housewife, and her military scientist husband, Hank. Throughout the story, Merrill plays up the tension between masculine scientific authority and the limited domestic and maternal authority of women.⁴¹ The male representatives of scientific authority downplay the increasingly widespread mutation and deformity of infants as an unfortunate but manageable consequence of nuclear war. In Maggie’s morning paper, she reads articles by a “well known geneticist” who cheerfully assures readers that doctors can now tell “with absolute certainty, at five months,” whether a child “would be normal, or at least whether the mutation was likely to produce anything freakish. The worst cases, anyway, could be

⁴¹ This dualism ties in with a similar approach taken by the anti-nuclear activism of the time – see Lisa Yaszek’s *Galactic Suburbia* (2008).

prevented” (Merril 7). Maggie silently responds, ““*Predicted and prevented.*’ *We predicted it, didn’t we? Hank and the others, they predicted it. But we didn’t prevent it. We could have stopped it in ’46 and ’47. Now...*” (ibid, italics original). Just as in Taine and Frank’s stories, male scientists cavalierly trade off reproduction and maternal agency for technological innovation and military advantage. In “That Only a Mother,” however, we see for the first time the psychological and reproductive costs of the nuclear age presented from a woman’s point of view.

As in *Mr Adam*, the toxic exposure damages only the male partner. Hank’s work as a military engineer has exposed him to an array of radiation and radioactive substances. Maggie constantly reminds herself of the various scientific authorities who insist that radiation and birth defects are not significant threats: the radiologist who “said Hank’s job couldn’t have exposed him,” or the “well-known geneticist” who “concluded cheerfully, the *worst* cases could now be predicted and prevented” (7). These patronizing reassurances, however, remain less than convincing. In a letter from her mother, Maggie reads,

“I’m thrilled, of course, but well, one hates to mention these things, but are you *certain* the doctor was right? Hank’s been around all that uranium or thorium or whatever it is all these years, and I know you say he’s a designer, not a technician, and he doesn’t get near anything that might be dangerous, but you know he used to, back at Oak Ridge. Don’t you think... well, of course, I’m just being a foolish old woman, and I don’t want you to get upset. You know much more about it than I do, and I’m sure your doctor was right. He *should* know....”(6)

Her mother self-deprecatingly echoes Dr. Crane's taunts in *Seeds of Life*: sterility is a worry for "foolish old women," not men. Maggie tries to force herself to find solace and distraction in the "feminine" parts of the newspaper: "*No, no. Stop it, now! Read the social notes or the recipes, Maggie girl*" (7, italics original). Both Maggie and her mother have internalized the message that women's bodies are rightfully policed by male doctors and a male-dominated scientific establishment which rejects "woman's intuition" as frivolous superstition.

Merril continues to draw attention to the vastly different consequences of radioactive exposure for men and women, and particularly the victimization of the maternal body at the hands of masculine science, represented by the staff of the hospital where Maggie gives birth. The doctors and nurses refuse to let Maggie touch or see her child, trying to "protect" her from the knowledge that her baby has been born without limbs. In letters to Hank from the hospital, she complains that "I kept telling that hatchet-faced female with the mutation mania that I wanted to *see* the baby. Finally the doctor came in, to 'explain' everything to me, and talked a lot of nonsense, most of which I'm sure no one could have understood, any more than I did" (10). Maggie experiences the authoritarian character of the medical and scientific establishment by way of the exclusionary power of its scientific jargon; rejecting the doctor's "nonsense," Maggie sees only the beauty of her newborn daughter, and comes to the punning conclusion that "a mother hasn't got a leg to stand on around here" (11).

Maggie's mutated daughter is indicative of a larger SF fascination with mutation resulting from exposure to radiation. Although this theme is present in the genre well before 1945 – as seen in *The Seeds of Life* and "The Blast," for instance – mutant stories come into their

own during the Cold War.⁴² The dread of radiation is displaced on to infants; the parents themselves are unharmed, and the costs of their generation's scientific hubris are apparent only when their "bundle of joy" arrives. These narratives are often quite psychologically complex. In Richard Matheson's "Born of Man and Woman" (1950), a malformed child is kept hidden and chained up by its parents. John Wyndham's *The Chrysalids* (1959, published in the U.S. as *Re-Birth*) imagines a theocracy on a post-apocalyptic Labrador, which preaches "the norm is the will of God," and ritualistically punishes the abnormal "genetic casualties" of nuclear fallout (Seed 1999, 56). In comparison to the disgust, persecution, and turmoil depicted in these stories, Merrill's treatment of the mutated baby in "That Only a Mother" is entirely sympathetic. Maggie loves her daughter unconditionally; although her willful blindness to her child's deformities is surely a sign of a mental break of some kind, Merrill locates the true derangement in a culture that knowingly damages its ability to reproduce and then demonizes innocent but "defective" children.

Maggie's stay in the hospital establishes that mutation is a death sentence for a growing number of babies like hers. "More infanticides all the time, and they can't seem to get a jury to convict any of them," she writes to Hank, who is not yet aware of his new daughter's condition. "It's the fathers that do it. Lucky thing you're not around, in case — Oh darling, that wasn't a very *funny* joke, was it?" (9). She then begs him twice to write more often. Despite her attempt to make light of the harsh reality, Maggie's letter firmly establishes the role of the father as a merciless figure, an implacable source of destruction fully allied with the medical and scientific authorities attempting to police the "monstrous" effects of their own scientific hubris. At the end

⁴² See Seed's *American Science Fiction and the Cold War* (1999), particularly pages 53-57, for good overview of SF's "mutant mania"; Robert Silverberg's 1976 anthology *Mutants* is also a useful compilation in this vein.

of her letter, Maggie suggests to the absent Hank that they name the baby Henrietta, an attempt to pre-empt paternal violence by forcing her husband to see himself in their daughter.

Hank is absent for the first year and a half of Henrietta's life before he returns home on leave. When he finally meets his daughter, the baby greets him with full sentences. Here, Merrill is working with a well-established science fiction trope in which characters are endowed with heightened intelligence as a trade-off for physical abnormality. In this case, Henrietta's precociousness makes her both more human – she is able to exhibit her fully formed sentence and to express love for her mother – and more unnatural. Hank recoils not just from the sight of his limbless child, but from her unnatural ability to speak both to and as an adult. Maggie, feeling only pride in her daughter's brilliance, tries to diminish Hank's horror as a "man's childish impetuosity," but the story closes with Hank, "in a bitter spasm of hysteria," tightening his fingers around his child (17). Merrill leaves the question of whether Hank actually murders his daughter unanswered; unlike Wylie's spectacles of carnage, Merrill depicts the horrific price of radiation – infanticide – as a private domestic act, carried out behind closed doors.

"That Only a Mother" is not merely a story of unconditional maternal love. It is a chilling indictment of an entire patriarchal system of medical and military authority, unwilling to face the human costs of its technologies. Maggie's warning – "It's the fathers that do it" – runs through many science fiction narratives of reproductive catastrophe. Where Taine and Frank minimize or satirize the psychological consequences of reproductive harm, Merrill makes the parents' anguish her central concern. Only Hank, the story's main representative of the scientific culture of the nuclear era, responds to his mutated child with murderous violence; like De Soto in *Seeds of Life*, his instinctual urge is to wipe out the evidence of his own reproductive failure. Maggie's blindness to her daughter's obvious abnormality, while touching, is perhaps even more tragic in

its doomed naiveté. Most interestingly, Merrill grants the child herself a distinct and rational voice, a “four-year-old mind” in a ten-month-old body. When Henrietta and Maggie argue about bath time, their dialogue is teasing and playful; “when can I go in the bathtub?” Henrietta asks. “When the outside of your head is as hard as the inside, brainchild” Maggie replies with a smile (13). No other text examined in this chapter makes such a clear stand for the fundamental humanity of the “monstrous” child.

Merrill returns to the theme of domesticity threatened by militarized science in her 1950 novel *Shadow on the Hearth*. Its protagonist, Gladys Mitchell, is a firmly domestic Westchester housewife, a busy homemaker and devoted mother. With the outbreak of WWII, her husband Jon is presumed dead, her son Tom (a freshman at a college in Texas) is missing, and her daughters, Barbara and Ginny, are exposed to radioactive fallout while at school. As television and telephone services disappear, the radio becomes Gladys’s only link to the outside world. Her home develops into an all-female refuge as Barbara and Ginny are joined by the Mitchell’s cleaning lady, Veda, and a female neighbor. The assembled girls and women listen to the state governor’s radio broadcast, which assures them that “We are living inside a great dome of safety, our whole nation protected by the radar sweep from bases prepared long ago” (21). This claim of domestic security is totally negated by the nuclear strike which already has occurred. Official authority and systems are compromised even further when the local Civil Defense leader, Jim Turner, is revealed to be an arrogant bully who uses the emergency to build his personal power and force sexual advances on Gladys.

Merrill’s depiction of the response to a nuclear strike differs significantly from Wylie’s violent mob actions; although Gladys is often confused or overwhelmed almost all of the characters remain calm and rational. The perceived and frequently mentioned threat of looters

never materializes. The depiction of government relief efforts is also more forgiving than in Wylie's jeremiads. Official interventions are, to be sure, almost always ineffectual or negative: Veda is briefly detained as a potential foreign spy, a harrowing trip to the hospital results in less treatment than Gladys could have accomplished at home, and Jim Turner is a lecherous boor. However, useful government aid also appears in the form of a pair of federal rescue workers who visit regularly to explain the basics of radiation poisoning and pass along vital supplies.

Outside of these visits and radio broadcasts, Gladys knows almost nothing of the larger political and military situation; Merrill focuses solely on the day-to-day challenges inside the domestic space of the home. The darkest episode in the entire novel, the trip to the hospital, is also the only time that Gladys leaves her house. The most useful aid comes from outside the scientific and military establishment; Gladys eventually shelters Garson Levy, a scientist discredited for his anti-nuclear activism and relegated to teaching science at the local high school. Crucially, Levy warns the Mitchells about the presence of radioactive fallout when every official channel insists that such a threat is unlikely or impossible, and he is able to perform blood tests to diagnose radiation exposure. With the help of Levy's scientific expertise and Veda's physical labor, Gladys cobbles together an admirably safe and functional postapocalyptic household. Crises arise and are dealt with through the combined expertise of the household; when a gas leak threatens to blow up the house, Gladys first attempts to use the recently repaired phone to call the fire department for help. After being roundly scolded by the telephone operator for "tying up the line," Gladys and Levy solve the problem with common sense and her husband's abandoned tool kit.

It is important to note, however, that this symbolic alliance between mothers and scientists is, as Lisa Yaszek points out, "at best only a partial solution to the problems posed by

the threat of nuclear war” (“Not Lost in Space” 85). The family unit is preserved when Gladys and her children renounce their “right” to board a train to a safe haven far outside the ruined New York City radius, but its long-term survival remains uncertain. Gladys’s husband Jon returns home, but with radiation burns and gunshot wounds; their missing son Tom has been located, but only because he has been drafted into the war effort. Ginny has radiation sickness and her hair has begun falling out. Merrill’s publishers deemed this pessimism unacceptable for her presumably female audience; in the original printing of the novel, Doubleday imposed a happy ending to conform to the requirements of the Family Book Club (Seed 1999, 59). This version of the narrative ends with Jon’s return and the joyful (and un-ironic) restoration of the Mitchell’s nuclear family. The 1966 edition drops this cheerful return to wifely duty and ends on a more somber note: Gladys traces her daughter’s radiation sickness to a beloved toy horse that was left outside during a radioactive rainfall. “Isn’t anything safe?” she demands. Merrill rejects jingoistic, masculinist militarism to focus squarely on the dangers lurking in suburbia, which both add to and stand apart from the specific threats of nuclear war. In both “That Only A Mother” and *Shadow on the Hearth*, patriarchal alliances of military, governmental, and scientific authority suppress uncomfortable and unpopular truths that materially affect the lives of women and children.

Merrill’s skepticism of authority, scientific and otherwise, makes her work both a feminist touchstone and an early indication of the tone of subsequent nuclear narratives in SF. After an initial jingoistic surge, the SF response to radiation and nuclear threat is often marked by complexity and thoughtfulness. Even at this early date, authors like Judith Merrill and Philip Wylie complicate the dominant Cold War narrative of atomic holocaust; in many ways, these

narratives suggest that the Soviet threat is no more destructive than the paired domestic threats of masculinist authority and technology run amok.

British Cold War Fiction

British fiction primarily responded to Cold War realities and fears through dystopia rather than apocalypse. A dystopian trend is already present in early twentieth-century British SF: E.M. Forster's short story "The Machine Stops" (1909), H.G. Wells's *The Sleeper Awakes* (1910), Aldous Huxley's *Brave New World* (1932), and Katherine Burdekin's *Swastika Night* (1937) are just a few of the most famous examples. After World War II, however, the themes of British Cold War fiction appear most clearly in George Orwell's *Nineteen Eighty-Four* (1949): "a matrix of tripolar conflict, US dominance, thought control, propaganda, tyranny, and oppression" (Hammond 666). In a 2003 study of British SF during and after this period, John Brannigan argues that this characteristic fatalism is largely attributable to the slow dissolution of the British Empire. Faced with a nation in political and economic decline, novelists "survey[ed] the landscape of the post-imperial aporia... with a mournful, backward stare," creating fictional futures defined by "loss, disappearance, remembrance, and nostalgia" (74). While SF in the U.S. also takes a more cynical and contemplative turn during the 1950s and 1960s, British SF takes somber introspection as a starting point.

John Wyndham's oeuvre is particularly emblematic of the trajectory of British SF during the Cold War. Wyndham began publishing short stories in American pulp magazines in the 1930s under the pen name John Beynon Harris.⁴³ His first SF novel, *The Day of the Triffids*

⁴³Wyndham's full name was John Wyndham Parkes Lucas Beynon Harris; he published under a number of pseudonyms comprised of parts of his name.

(1951), was wildly successful in Great Britain and abroad, and is discussed at some length in Chapter Five of this dissertation; in the context of Cold War fiction, its narrative of an assault by sentient carnivorous plants explores the potentially devastating post-war complacency (represented by actual blindness) of the British. 1953's *The Kraken Wakes* (published in the U.S. as *Out of the Deep*s) repeats the organic-invasion motif of *The Day of the Triffids*, with strange creatures that appear in the oceans. The British military detonates a nuclear device in a pre-emptive attempt to keep the creatures away from the British Isles, which has the reverse effect of rousing the creatures to a murderous rampage.⁴⁴ *The Chrysalids* (1955, mentioned earlier in this chapter) depicts a dystopian post-apocalyptic Labrador obsessed with mutation; *The Midwich Cuckoos* (1957, twice adapted to film as *Village of the Damned*) similarly explores Cold War paranoia as filtered through reproductive abnormality and a claustrophobic small-town setting.

Writing in 1973, British SF author and critic Brian Aldiss famously describes Wyndham's novels as paradigmatic "cozy catastrophes":

The essence of cosy [sic] catastrophe is that the hero should have a pretty good time (a girl, free suites at the Savoy, automobiles for the taking) while everyone else is dying off. The best and most memorable example of this sub-genre is American: George Stewart's *Earth Abides*; but it was the British writers – less preoccupied with aliens than their American counterparts – who specialized in Wyndhamesque comeuppances. (254)

In the cozy catastrophe, the familiar and commonplace is demolished by a devastating event

⁴⁴ The similarity of this plot to those of Japanese *kaiju* films, in which monsters emerge from obscurity to level cities, is noteworthy but almost certainly coincidental. In the film *Godzilla* (1954), which set the template for the form, a giant reptilian beast is roused from the deep ocean by nuclear blasts. These Japanese and British narratives display a much more wary attitude regarding nuclear weapons than is typical in American SF of the period, which often depicts "nukes" as the ultimate solution to monstrous threats. For more on the nuclear narrative in film, see M. Keith Booker's *Monsters, Mushroom Clouds, and the Cold War* (2001).

which leaves the main characters relatively unscathed. The survivors, although understandably traumatized, are freed from the old constraints of civilization. “The Blast,” for example, is a fine example of the type. Aldiss, however, argues that the cozy catastrophe is a distinctly British anxiety fantasy, that eschews heroics in favor of muddling through. Its popularity with British readers “was something to do with the collapse of the British Empire,” he speculates, “or the back-to-nature movement, or a general feeling that industrialization had gone too far, or all three” (254). The cozy catastrophe, like Merrill’s domestic nuclear narratives, resonates with larger Cold War themes in SF, especially the idea of invisible threats threatening the perceived sanctity of bodies and homes; like earlier Cold War SF, it also strongly implies that these threats are, at best, blessings in disguise, and at worst, avoidable or survivable.

While the apocalyptic narrative – in both its American and British variants – remains popular today, two literary events in the 1960s begin to shift the larger toxic narrative’s trajectory. The first is the rise of “New Wave” or “soft” science fiction, often attributed to Michael Moorcock’s 1964 editorship of the magazine *New Worlds*. Moorcock sought to use the magazine to mark a conscious break with the pulp tradition of square-jawed heroes and exacting scientific accuracy.⁴⁵ New Wave science fiction fostered an increased tolerance for stylistic experimentation as well as a growing diversity of voices in a traditionally white, male genre; it encouraged attention to gender issues and feminism, computers, and cybernetic technology. The second event, the publication of *Silent Spring* in 1962, focused popular anxieties about the ubiquity and hidden dangers of man-made chemicals saturating the environment. Indeed, the “eco thriller” grew as a science fiction sub-genre throughout the 1970s and into the early 80s (when it was eclipsed by the popularity of cyberpunk).

⁴⁵ Some writers (notably Brian Aldiss and J.G. Ballard) gained popularity as “New Wave” authors but had been publishing since the 1950s. For more on this moment in genre history, see Brian Stableford’s “The Third Generation of Genre Science Fiction” in *Science Fiction Studies* 23:3.

Even after the New Wave and Carsonian turns, however, nuclear apocalypse never disappears from SF. The theme appears again most prominently in the 1980s, in works including Russell Hoban's *Riddley Walker* (1980) and Neal Barret Jr.'s *Through Darkest America* (1986). In both novels, lone heroes travel across once-familiar landscapes (England and the American West, respectively) rendered barbaric and ignorant by hundreds of years of suffering after a nuclear apocalypse. John Briggs's 1982 graphic novel *When the Wind Blows* presents an updated cozy catastrophe; an elderly British couple, Jim and Hilda Bloggs, attempt to ride out a Soviet nuclear attack on Britain with the cheery optimism of "the spirit of the Blitz." Jim and Hilda's unshakeable trust in government pamphlets leads to their quiet and bittersweet deaths in their backyard fallout shelter.

The post-war SF fascination with radiation and nuclear threat draws on the pulp and horror traditions, the didacticism of scientific romance, and the narrative structure of "last man" apocalyptic scenarios. Over the course of the Cold War, the genre diversified in myriad directions, including jingoistic World-War-III apocalypse stories, cozy catastrophes, and New Wave dystopias, but almost all incorporate at least some antagonism toward scientists and governmental authorities who cannot effectively predict, control, or prepare for the magnitude of the forces unleashed by their technologies. Most importantly for this dissertation, Cold War SF ultimately sets the stage for *Silent Spring*'s paradigm shift from nuclear fallout to chemical threats. They open a serious consideration of the invisible reproductive and psychological toll of toxic exposure – once so easily dismissed in texts such as "The Blast" or *Mr Adam* – as well as creating a subversive cultural narrative of environments and bodies being disregarded and destroyed by short-sighted greed, militarism, and nationalism. In contesting the pieties of civil

defense campaigns, which assured citizens that their families and homes would remain essentially inviolable to toxic threats, these science-fictional warnings predate and presage Carson's calls for direct and open dialogue in *Silent Spring*.

CHAPTER THREE

SILENT SPRING AND SCIENCE FICTION

The publication of Rachel Carson's 1962 *Silent Spring* is a crucial cultural and rhetorical moment in the development of the toxic narrative in science fiction. It is widely regarded as the foundational text of the modern toxic narrative; Laurence Buell, for example, calls *Silent Spring* "the book that inaugurated the literature of environmental apocalypse" (285). The book immediately shot to the top of the best-seller lists and remained there; it sold a quarter-million copies in its first months of publication, and has now sold more than ten million copies. Its importance in the popular history of science is rivaled only by Darwin's *Origin of Species*, and Carson's lucid yet lyrical writing style remains the gold standard for both nature and science writing. Its popularity stemmed, in part, from its deep distrust of government and industry claims about the safety of pesticides, and its discussion of the widespread effects of toxins on the human body. Carson resituated readers' bodies into complex biochemical, genetic, and developmental processes; her examination of the effects of toxins on reproduction, health, and quality of life resulted in a radically altered vision of a natural world permeated by toxins.

It is important to remember that in her skillful deployment of data and imagery designed to dramatize anxieties surrounding toxins, Carson was not working from a rhetorical tabula rasa; as Frederic Buell points out, "toxic fear was invoked rather than invented by Carson" (110). Almost a century before Carson published *Silent Spring*, George Perkins Marsh wrote *Man and Nature: Or, Physical Geography as Modified by Human Action*, one of the first works to scientifically document the deleterious effects of human action on the environment. In the book's

final chapter, Marsh warned that the expanding American republic might repeat the mistakes of classical Europe, destroying its own natural bounty through careless expansion, extraction, and industrialization. Nineteenth-century urban reformers and novelists also described the horrors of city- and factory-besmirched landscapes with breathless disgust; think of the grimly soot-stained Coketown of Dickens's *Hard Times*, or the smog-smothered steel town in Rebecca Harding Davis's *Life in the Iron Mills*. Carson, however, was able to draw on the comparatively modern conventions of both nature writing and popular science to position her argument as both exposé and meditation.⁴⁶

Some critics of the day disparaged *Silent Spring* as a wholesale piece of science fiction, aligning it with “the speculative, emotional, sensational products of the entertainment industry, utterly devoid of the rigor, objectivity, and clarity of true scientific writing” (Killingsworth and Palmer 2000, 175).⁴⁷ Carson herself acknowledged that much of her writing was speculative; early in *Silent Spring* she admits that “the full scope of the dangerous interaction of chemicals [on the body] is as yet little known” (Carson 32). Killingsworth and Palmer have demonstrated that although nothing in her private correspondence or public writing suggests that Carson was a reader of SF, she nevertheless uses the techniques of science fiction to “puncture the twin dreams of unlimited scientific progress and absolute human mastery of the physical environment,” dreams on which the pesticide industry traded (2000, 145). Her prose often draws on an apocalyptic frame of reference that science fiction and years of Cold War rhetoric had planted in her readers' minds, particularly in her use of the iconography of chemical warfare and radioactive fallout. This chapter demonstrates the ways in which SF narratives of toxic exposures

⁴⁶ For an excellent study of Carson's rhetorical strategies, see the essays collected in *And No Birds Sing: Rhetorical Analysis of Rachel Carson's Silent Spring* (2000), as well as *Rachel Carson: Legacy and Challenge* (2008).

⁴⁷ See Graham's *Since Silent Spring* and Michael B. Smith's essay “‘Silence, Miss Carson!’” for contemporary reviews and responses.

primed readers for *Silent Spring*, and then responded to it in turn. After a discussion of *Silent Spring* itself, I analyze Ward Moore's 1947 novel *Greener Than You Think* as indicative of the way SF registers a pre-existing mid-century uneasiness regarding industrial chemistry, particularly in an agricultural context. I then explore the SF response to *Silent Spring*, and the way in which the resulting cross-pollination later manifests in mainstream fiction.

“A Fable for Tomorrow”

Rachel Carson trained as a marine biologist and became a successful science writer, best known for her prize-winning books about the ocean, *The Sea Around Us* (1952) and *The Edge of the Sea* in (1955). She wrote expressive and informative magazine articles aimed at fostering an appreciation for the complexities of ecology, with titles like “Help Your Child to Wonder” (1956). She planned another book on “the ecology of life,” examining the ways in which human beings were inextricable from their environments. While conducting research for this project, Carson received a letter from a friend, Olga Huckings, describing the sudden deaths of her garden's birds after an aerial spraying of the common pesticide DDT. Carson had, in 1948, proposed an article to *Reader's Digest* which would discuss the potential harm for the wide-area spraying of chemicals; after reading her friend's letter, Carson determined to write an entire book on the subject of pesticides.

The book's seventeen chapters make four main points: first, we are all contaminated, without our consent, by poisons in the form of pesticides. Second, because of the existence of equally effective and less toxic methods of pest control, the risks to both humans and animals are unnecessary. Third, pesticides often make problems worse rather than better; and finally, we

have the right to know about the risks we are being exposed to, and the attendant obligation to act in response to that knowledge. Her revelations of widespread toxic threats to human and environmental health galvanized readers to activism and regulatory zeal, and touched off debates – about the use of pesticides (especially DDT), the proper role of government environmental oversight, and consumers’ rights to know the contents and risks of the products they purchase and use – which continue into the present day.

Carson’s opening chapter, “A Fable for Tomorrow,” frames her exhaustively researched exposé as a fairy tale; she uses the familiar trope of the ruined pastoral idyll to dramatize an unfamiliar threat. By invoking the mythography of betrayed paradise, Carson aligns with the norms of the toxic narrative: exposing the dark underside of a faith in scientific progress. “Only yesterday mankind lived in fear of the scourges of smallpox, cholera, and plague that once swept nations before them,” she writes. “Today we are concerned with a different kind of hazard that lurks in our environment – a hazard we ourselves have introduced into our world as our modern way of life has evolved” (187). Carson retains the nature writer’s traditional emphasis on human culpability and hubristic meddling, but the scale of the problem is drastically re-cast; by tracing the complex paths of chemicals, Carson deconstructs and redefines the relationship between the microscopic and the global, and between scientific progress in eradicating disease and the new health and ecological threats posed by the industrialized use of pesticides.

How, when the media venerates the spectacular, can one bring attention to the incremental and anonymous dangers occurring at the molecular level? Carson begins her “Elixirs of Death” chapter, which outlines pesticide chemistry, by creating anxiety over the insidious effects of these compounds: “In the less than two decades of their use,” she writes, “The synthetic pesticides have been so thoroughly distributed throughout the animate and inanimate

world that they occur virtually everywhere” (15). In the chapter “The Human Price,” she writes that the use of toxic pesticides “casts a shadow that is no less ominous because it is formless and obscure, no less frightening because it is simply impossible to predict the effects of lifetime exposure to chemical and physical agents that are not part of the biological experience of man” (188). Carson invokes the fear of the unknown as a powerful counter to complacency; like a good monster movie, the most terrifying threat is the one that lurks just on the edges of perception. The invisibility of the toxic threat, she skillfully insinuates, is the very thing that we should find most frightening.

Greener Than You Think

Chemical dangers were not new when Rachel Carson began writing *Silent Spring*. Toxic lead and arsenic compounds had been in wide use in agriculture since the 1867 introduction of “Paris green,” a rodenticide and insecticide compounded of copper and arsenic. In 1944, more than 75 million pounds of lead arsenate alone was applied to American agricultural fields.⁴⁸ Throughout the early- to mid-twentieth century, press stories of acute poisonings by way of fruits and vegetables were common. While public health advocates were justifiably alarmed, there was little sizeable public or media outcry until the thalidomide scandal and “cranberry scare” of late 1950s and early 1960s. The drug Thalidomide was widely prescribed to pregnant women in the 1950s as a cure for morning sickness; it caused catastrophic birth defects. In the cranberry scare of 1959, discussed further in Chapter 5, 99% of that year’s U.S. crop of cranberries was discovered to contain traces of the weed killer aminotriazole. This news broke just before the

⁴⁸ On the history of pesticide and herbicide use in agriculture see Brooks, *The House of Life: Rachel Carson at Work* (1972).

holidays and caused the Ocean Spray company to ban amitrole's use in its cranberry growers' bogs. These and other scandals help explain why Carson found a receptive audience for her message of toxic incursion into the supposedly inviolable spaces of homes and bodies, even in the face of strong pushback by the chemical industry and an emergent agribusiness industry.

Science fiction also played an important, and commonly underestimated, role in priming the reading public to be receptive to the globally scaled arguments of a book such as *Silent Spring*. Ward Moore's 1947 novel *Greener Than You Think* foreshadows Carson's suspicion of the appropriation of scientific research for capitalistic ends, as well as her dread of the invisible threats lurking in suburbia. The villain of *Greener Than You Think* is not Soviet Russia, or even a spectacular atomic blast. It takes the form of that most thoroughly subdued and controlled of landscapes: the suburban lawn. In suburban America in particular, an entire "lawn culture" arose after WWII as new homeowners devoted themselves to the creation and maintenance of perfectly manicured half-acres. A staggering amount of water, herbicides, pesticides, and fertilizers are poured into creating these lush carpets of Kentucky Bluegrass in defiance of climate, geography, and biology; up to sixty percent of urban water in the American West goes to watering lawns, and lawn-owners use ten times the amount of pesticides per acre as industrial agriculture (EPA "Pesticides"). Yet the very ubiquity of the lawn makes it effectively invisible. The first page of Moore's novel describes the imagery evoked by the word "grass" as "only of a vague area in parks edged with benches for the idle" (Moore 1). Moore turns this most mundane of organisms against its human masters; while his novel is less obviously indebted to Wells's *The Food of the Gods* than its pulp predecessors, it strikes many of the same notes of social satire and genuine horror.

Josephine Francis is a self-taught agricultural chemist, working out of her tiny apartment in “the wrong part of Hollywood.” She has invented her own version of the Food of the Gods: a fantastic chemical inoculation for grasses which she calls “the Metamorphizer.” The novel’s supremely unsympathetic narrator/memoirist, Albert Weener, responds to her newspaper ad for a salesman. “Plants will be capable of making use of anything within reach,” she explains to him. “No more used up areas, no more frantic scrabbling for the few bits of naturally rich ground, no more struggle to get artificial fertilizers to wornout soil in the face of ignorance and poverty” (2). The Metamorphizer will eliminate the need for the “miserable, makeshift expedients” of fertilizers. “What is a fertilizer?” Miss Francis scoffs. “A tidbit, a pap, a lollypop. No use being held back because you’ve only poor materials to work with – leap ahead with imagination. Change the plant itself, Weener, change the plant itself!” (2). In her impatience with her field’s standard explanations and cautious methodologies, Miss Francis’s speech evokes the “mad scientists” trope. Unlike her male mad-scientist predecessors, however, her single-minded focus on her research does not blind her to its practical applications, or its potential for mis-use; unlike the scientific obsessives in Hawthorne or H.G. Wells’s narratives, Miss Francis conducts her research not merely for “the sake of science” or for the acclaim of her peers, but for the free and open benefit it may bring to everyday people struggling “in the face of ignorance and poverty.”

Miss Francis is also an unusual figure by science fiction genre conventions in a more obvious way: she is an undeniably brilliant female scientist who is neither villainous, out of her depth, nor a love interest for the hero. Her ambition and hubris, while squarely in line with the qualities of the stereotypical mad scientist, are themselves atypical for a female character.

Weener frequently comments on the “unnaturalness” of Miss Francis.⁴⁹ She is a large, unattractive woman: “Her shapeless legs were columns with large flat-heeled shoes for their bases, supporting the inverted pediment of great hips. Her too short, grease-spotted skirt was a mighty barrel and on it was placed the tremendous drum of her torso” (2). Miss Francis’s appearance marks her as a female version of the stock character of the absent-minded or antisocial professor, echoing the ridiculous appearance and bumbling demeanor of Mr. Bensington, the more feckless of the two scientists in *Food of the Gods*. Also like Bensington, Miss Francis is both living and inventing in a failed domestic space, in this case her “slovenly” apartment. But the shift in gender is in some ways the antithesis of the gendered monstrosity in “Rappacini’s Daughter” and *Elsie Venner*; her aggressive defeminization appears in dramatic counterpoint to the uncontrollable, aggressive fertility of her invention.

Her position outside academia and professional agricultural chemistry also means that Miss Francis has no ready funding for her work; as a last resort, she places the ad, hoping for an agent who can distribute her invention at cost to grain farmers. Weener’s first and only thought it to peddle the Metamorphizer in a diluted form to suburban lawn owners. Miss Francis dismissively insists that this use is not only beneath the dignity of her invention, but wrong-headed entirely. “Lawns? Nonsense!” she objects. “Do you think I’ve spent years in order to satisfy suburban vanity?” (2). Weener ignores her and hits the sidewalks, peddling a tank of Metamorphizer door-to-door in true huckster fashion as “Dr Francis’ Lawn Tonic.” His first and only sale is a \$5 treatment for a patch of diseased Bermuda grass in a neglected lawn, “repellent to foot and eye alike” (5). Overnight, the grass turns lush and green. It grows to the height of a man and stubbornly resists the mowers and scythes turned against it. A crowd gathers, and

⁴⁹ It is, of course, worth noting that Weener is an unreliable narrator as well as an unsympathetic character, so his overwhelming disgust toward Miss Francis should be taken with a grain of salt.

Weener is “suddenly aware of their cautious avoidance of contact with the grass itself. It emphasized the new awesomeness of the grass; it was no longer to be lightly approached or frivolously treated” (12). Two days after the initial application, and less than a day after being scythed down to a ragged stubble, the “devilgrass” has grown to roof-height.

More disturbingly, it has begun to encroach onto the neighboring lawns:

...the grass had invaded the neat plots behind, blurring edges, investigating flowerbeds, strangling shapely bushes. These weren't the ravages which upset me; it was reasonable if not entirely comfortable to see shrubbery, plants and blossoms swallowed up. Work of men's hands, they bear the imprimatur of nature. The cement sidewalk, however, was pure artifice, stamped with the trademark of man. Indignity and defeat were symbolized in its overrunning; it was defiance, challenge. But the grass was not satisfied with this irreverence: it was already making demands on curbing and gutter. (19)

Weener instinctively draws a stark division between “nature” and “artifice,” and identifies the spread of the grass as a horrific violation of a “natural” order in which man is the uncontested master of his domain. He views himself (and by extension all humanity) as the rightful lord and master of the natural world. Moore emphasizes the psychological shock – the “indignity and defeat” – of being unable to command a “lower” organism, and especially an organism as insignificant as a patch of crabgrass. It is not merely the rate of growth that marks the grass as monstrous, but its appearance of *agency*. “For, no matter what botanists or naturalists may tell us to the contrary,” Weener opines, “we habitually think of plantlife as fixed and stolid, quiescent. But this abnormal growth was no passive, sleepy patch of vegetation” (31). The movement of the

grass, in contrast, seems to be almost consciously destructive: “Its movement, by human standards, was slow, but it was so monstrous to see this great mass of verdure move at all that it appeared to be going with express speed, inexorably enveloping everything in its path” (31). Los Angeles is destroyed in weeks, and the grass – now consistently referred to as a proper noun, the Grass – spreads implacably east.

As the Grass swallows ever-wider swathes of the United States, the government attacks it with fire, salt, bombs, and entire Army regiments, to no effect. Tanks and infantry simply disappear into the wall of giant green blades. Countless individuals, driven by fascination, religious fervor, or despair, commit “suicide by Grass”; they are drawn to it not only by fear but because it is fearsomely sublime, because “it has never happened in nature before” (101). Weener himself is airlifted onto the surface of the Grass, where he learns firsthand that the horror of the monstrous Bermuda grass is mixed with a strange and almost irresistible sense of peace, even euphoria. Watching the wave-like undulations of the surface, he reports that a “sensation of tremendous wellbeing seized on me” (59). During his subsequent rescue by helicopter, he snaps out of this near-hypnosis only when he recognizes the comforting artifacts of human culture – “every bolt-head, rivet, scratch, dent, seam and panel. They were artificial, made in a blessed assembly line” – inside the helicopter (59).

Weener’s love of the “blessed assembly line” foreshadows the overt anti-capitalist critique of the novel’s second and third acts. Obviously, this critique has been implicit since the first pages, when Miss Francis’s original selfless goal of ending hunger is twisted by a door-to-door salesman who can only think in terms of the easiest dollar. But this cynical view grows more marked as the novel develops. In one vignette, an Army captain who tries to blow up the Grass against all scientific advice is revealed to be related to the owners of an explosives

company. In the panic of the Grass's spread, the government nationalizes banks and other vital services, and so Miss Francis is accused by a member of the Congressional Committee to Investigate Dangerous Vegetation of being "a paid agent of the Communists" (48). Always out for a quick profit, Weener sells the use of his name as a "special Grass correspondent" to a newspaper and uses this income to buy shares in Consolidated Pemmican and Allied Concentrates, a shell company used by shady stockbrokers to turn a small but regular profit.

In one of the novel's few direct mentions of the Cold War, the Soviet Union invades the West Coast and attempts to use a combination of tanks and ski troops to cross the tops of the Grass and strike at the vulnerable states beyond. Weener is able to use Consolidated Pemmican to turn war profiteer. The Grass quickly swallows up the invading Soviets, along with vast swaths of grazing acreage and farmland, and demand for Weener's "concentrated foods" skyrockets, turning him into an international tycoon. He consolidates raw materials and power until he is the world's sole remaining employer, food supplier, and military leader. Swollen with self-importance, Weener considers himself "not only the wealthiest, most powerful man in the world, but its savior and providence as well" (142). He packs Miss Francis off to an Arctic research station to perfect a chemical antidote for the Metamorphizer, and builds himself a fortified mansion while the rest of the world starves. In the end, of course, Weener pays for his callousness: the final line of his memoirs, written aboard the sanctuary of his mega-yacht, reads simply, "The Grass has found another seam in the deck" (185). Like Wells's *Herakleophoria*, the *Metamorphizer* serves as a manifestation of anxieties regarding the unpredictable and ultimately uncontrollable effects of scientific tinkering. Its spread is simply faster and more violent; the Grass is almost predatory in its agency. In comparison, the "pertinacity" of the Food in Wells's novel seems almost charming.

Greener Than You Think is forward-looking not only in its depiction of genetically modified plants, the rise of agricultural chemistry, and a corporately controlled world food supply, but in its deep skepticism regarding the increasingly cozy relationship between science and capitalism. Carson herself was extremely critical of the role of capitalist greed in the careless use and over-use of chemicals, many of which were either of dubious safety or demonstrably hazardous. She asserts that the “very limited awareness of the threat” of chemical insecticides and herbicides is due, in equal parts, to a scientific parochialism which ignores or dismisses research from outside of one’s own narrow field, and to the cultural domination of industry, “in which the right to make a dollar at whatever cost is seldom challenged. When the public protests... it is fed little tranquilizing pills of half truth” in order to protect the profitable status quo (13). Indeed, her narrative of industry as the enemy “has now become an entrenched way of thinking in the environmental movement” (Glotfelty 159).⁵⁰ Her anti-capitalist critique exposed her to accusations of being “un-American”; in a letter to former President Dwight D. Eisenhower, former U.S. Secretary of Agriculture Ezra Taft Benson reportedly concluded that Carson was “probably a Communist” (Lear 430).⁵¹ Such ad hominem political attacks against Carson continue into the present day; in 2012, for example, the Cato Institute (a far-right think tank) published a collection of anti-environmentalist essays under the title *Silent Spring at 50: The False Crises of Rachel Carson*. Among its arguments are assertions that Carson was an ignorant pawn of the U.S. Fish and Wildlife Service, that her work was part of a campaign spearheaded by the FDA to expand the powers of the federal government, and that her arguments deliberately sought to undo improvements that had increased life expectancy and U.S. per capita

⁵⁰ See Lisa Sideris’s argument on Carson’s role in the foundation of the modern “secular religion” of environmentalism in “Fact and Fiction, Fear and Wonder” (2014).

⁵¹ Benson’s comment was widely repeated at the time, but was never conclusively confirmed.

incomes. The authors generally conclude that Carson's work was sloppy at best, and very likely an intentional deceit to justify restrictions on individual freedoms and technological innovation.⁵²

Although many present-day critics take Carson's imbrication in political rhetoric as a given – Linda Lear's *Rachel Carson: Witness for Nature*, for example, argues that the specter of atomic war, the Korean War, and the space race form the imaginative backdrop for Carson's entire oeuvre – contemporary readers and reviewers did not respond to *Silent Spring* as part of the Cold War cultural context. Waddel notes that in more than six hundred reviews published in 1962 and 1963, there are no significant references to Cold War politics or even nuclear rhetoric (9). Instead, their responses focus on everything from Carson's scientific credentials (or the supposed inferiority thereof), her prose style, and the recent thalidomide tragedy.

Carson was, however, undeniably tapping in to the apocalyptic rhetoric of the Cold-War nuclear narrative. The first pollutant mentioned by name in *Silent Spring* is not a pesticide, herbicide, or fertilizer, but the radioactive element strontium-90, one of the most dangerous components of nuclear fallout. In an early draft of "A Fable for Tomorrow," Carson even wrote that the appearance of a mysterious and deadly powder reminds people of the radioactive dust that fell on the *Lucky Dragon* (Lutts 35). Using the reading public's existing knowledge of the dangers of nuclear fallout, Carson is able to evoke the invisible threats of pesticides and chemical toxins. In *Silent Spring*'s second chapter, "The Obligation to Endure," Carson points out that while radiation has been naturally present on earth for hundreds of millions of years – including solar radiation, "from which all life draws its energy" – life has always had time to adjust and

⁵² The Cato Institute, not coincidentally, is still primarily funded by its founder, Charles Koch; Koch Industries is the second-largest privately held company in the U.S. and has massive financial interests in fertilizers, petroleum refining, industrial chemicals, and paper milling.

evolve to accommodate these hostile elements. In the modern world, however, “new chemicals come from our laboratories in an endless stream”:

The rapidity of change and the speed with which new situations are created follow the impetuous and heedless pace of man rather than the deliberate pace of nature. Radiation is no longer merely the background radiation of rocks, the bombardment of cosmic rays, the ultraviolet of the sun that have existed before there was any life on earth; radiation is now the unnatural creation of man’s tampering with the atom. The chemicals to which life is asked to make its adjustment are no longer merely the calcium and silica and copper and all the rest of the minerals washed out of the rocks and carried in rivers to the sea; they are the synthetic creations of man’s inventive mind, brewed in his laboratories, and having no counterparts in nature. (7)

These “unnatural” and “synthetic creations” often directly mimic the harmful effects of radiation, causing cancer, mutation, and sterility. Carson is asking her readers to think critically about the underlying values and assumptions of scientific progress – speed and novelty are not necessarily virtues when dealing with materials with such a pronounced potential for harm.

Carson continues to reinforce the similarity of the dangers represented by industrial chemistry and military science throughout *Silent Spring*. “Only a few decades ago, no one knew these effects of either radiation or chemicals,” she writes. “In those days the atom had not been split and few of the chemicals that were to duplicate radiation had as yet been conceived in the test tubes of chemists” (208). In a post-Hiroshima world, however, in which “even the

nonscientist now knows the potential results of radiation,” ignorance is no longer an excuse for inaction (209).

In the closing chapter of *Silent Spring*, Carson employs a steady stream of military imagery and language, but her target is not the use chemistry to control insect populations, but the *overuse* of chemicals. The “warfare” itself is not as problematic as the use of inferior and indiscriminate weapons.⁵³ Carson’s most famous target, DDT, offers perhaps the clearest example of the rhetorical power of her military metaphors. It also dramatizes the risks and shortcomings of this metaphor as a heuristic tool. Dichlorodiphenyltrichloroethane was first manufactured and used extensively during WWII to combat typhus, malaria, and other insect-borne diseases, and was then marketed as “the war hero pesticide” and used widely in public health programs. In an essay on the indelible association between Carson and DDT, Steve Maguire asserts that, with the possible exception of vaccines or antibiotics, no other chemical has been the recipient of “such extensive, prominent and repeatedly anthropomorphizing journalistic treatment. DDT is, in fact, an icon of our modern age; it is a powerful symbol of our ‘risk society’” (Maguire 201). In singling out DDT, the golden child of industrial chemistry, as the bane of songbirds, Carson was staking out a more pugilistic rhetorical stance than most contemporary readers may appreciate. *Silent Spring* almost single-handedly led to anti-DDT regulations and an eventual ban on its use in the United States; this ban was, in many ways, the first victory of the modern environmentalist movement.⁵⁴

⁵³ This is in contrast to some ecofeminist claims that “mechanical philosophy and science induced the ‘death’ of nature” and have “steadily critiqued ‘masculine’ modes of detachment and objectivity embedded in the Western scientific perspective” (Sideris “The Ecological Body” 143).

⁵⁴ The debate surrounding DDT is still deeply polarized. Its links to cancer have never been conclusive, and most environmental groups do not object to the judicious use DDT to fight malaria. As Tina Rosenberg puts it, “liberals still tend to consider it a symbol of the Frankenstein effects of unbridled faith in technology. For conservatives... DDT continues to represent the victory of overzealous regulators and Luddites who misread and distort science”

The Clone

A deep ambivalence regarding scientists and industry, although seen in pre-Carson science fiction such as *Greener Than You Think*, becomes more pronounced after *Silent Spring* foregrounds the issue in the public consciousness. Kate Wilhelm and Theodore L. Thomas's 1965 novel *The Clone* is a "blob story," albeit an exceptionally intelligent one, whose plot and narrative style are clearly indebted to the language and imagery of *Silent Spring*. It traces, over the course of a single day, the rampage of an increasingly massive semi-sentient mass of chemicals through Chicago's sewers and streets; in many ways *The Clone* is an imaginative extrapolation of *Silent Spring*'s anxieties regarding industrial chemistry. In the novel's opening pages, an omniscient narrator informs the reader that

The array of chemical compounds carried by the sewer system of a city is unbelievable. There are ground-up foods of every conceivable kind. There are soaps and detergents, discarded medicines, spices and flavorings and colorings and inks, cosmetics and rinses and bleaches, resins and catalysts and enzymes, and the waste products of life processes. The blending of these materials in an almost infinite variety of concentrations and under a wide range of temperatures and pressures produces a chemist's cauldron from which anything might spring.
(Thomas and Wilhelm 6)

Muriatic acid dumped down a drain by a janitor reaches one such "chemist's cauldron," where it touches off a chain of reactions that converts the collected chemical and organic wastes of the Windy City "into something very much like amniotic fluid. The pool, the concrete pool, became

(Rosenberg 39). The official U.S. Fish and Wildlife Department web page on DDT also includes a section debunking "common myths" about both DDT and Rachel Carson.

a womb” (7). This spontaneous artificial womb incubates a creature that Wilhelm and Thomas call “the clone,” after an older meaning of the term which refers to the asexual reproduction employed by bacteria or plants.

From the beginning, the clone embodies this tension between human qualities (the womb, the amniotic fluid) and monstrous inhumanity (asexual and uncontrollable growth). Early chapters repeat scenes of intrusion into domestic spaces: the privacy of apartments, the quotidian spaces of diners, offices, and schoolrooms, even the consumerist frenzy of a department store sale. The clone insinuates itself into these human spaces by pushing its ever-growing appendages through the city’s circulatory system of drains, pipes, basements and tunnels. By the time its presence is obvious it is often too late to do anything; the damage is already too extensive, its tendrils sunk too deeply into the city’s infrastructure. In this sense, the clone is uncannily like a cancer in a human body, growing tenaciously even when the result is the destruction of its host organism. It incarnates both a fear of chemical chaos and of uncontrollable growth itself: “The clone was *a creature of growth*,” Wilhelm and Thomas write, “and all the nutrients it needed were at hand” (9, emphasis mine). Eventually, those nutrients include not only concrete and dish soap, but the raw materials in the bodies of Chicago’s human inhabitants. The clone’s cancer-like consumption of human bodies provides another link to the rhetoric of *Silent Spring*. Exposures to the clone metaphorically model human exposures to cancer-producing chemicals; they are “uncontrolled and they are multiple” (Carson 237).⁵⁵

In a subversion of the hero-scientist trope of Golden Age science fiction, the majority of the novel’s scientists are unattractively self-assured, repeatedly touching the clone even when explicitly warned against doing so, and losing limbs and lives as a result. Only the novel’s

⁵⁵ Carson was herself battling breast cancer while she wrote *Silent Spring*; the disease killed her in 1964.

protagonist, scientist Mark Kenniston, and working-class characters – short-order cooks, dishwashers, electrical engineers, subway foremen, and rescue divers – immediately appreciate the danger of the clone’s writhing tentacles and take effective action against it. Indeed, as in much Cold War fiction, the biggest danger in the novel is complacency. Dr. Kenniston wants to announce that the still-underground clone has overrun huge sections of Chicago and initiate a full evacuation of the city. “You can’t spread that story,” the mayor protests. “Have you realized what it would do to morale to say something that big is under the streets? The whole city will panic!” “Better they should panic and run than stay calm and get eaten,” Kenniston replies (87). The mayor chooses to announce that the city has been invaded by snakes, rather than an unseen chemical mass; this misinformation attempts to transform the danger of chemical pollution into something ostensibly more familiar.

Kenniston spearheads the novel’s central conflict between scientists and engineers pressing for immediate evacuation and bureaucrats who want to avoid negative publicity at any cost. In many ways, this Carson-esque agitation for awareness and action defines the novel even more than the ravages of its titular blob. While the climax of the novel maintains the genre norm of science victorious over ignorance (Kenniston and his allies successfully neutralize the clone with iodine), the denouement is much more pessimistic. Chicago is not a special case, the narrator warns: “beneath every great city there flow streams of water rich in nutrients and minerals, and containing ample energy to supply the driving force for almost every chemical reaction” (143). Wilhelm and Thomas’s final lines recite the same laundry list of chemicals dumped down drains and sewers every day that appeared on page one: nothing has really changed. The chilling implication is that the “birth” of the next clone is only a matter of time. The operative anxiety at work here is the fear that humanity’s chemical interventions into natural

processes have become too numerous and complex for us to even begin to track or understand them; effectively, Wilhelm and Thomas have created a fictionalization of Carson's argument that our fear of "the formless and obscure" should be greater, not less, than our fear of more obvious threats.

The End of the Dream

Philip Wylie's Cold-War SF novels are already familiar from Chapter Two of this dissertation. His bibliography provides an exceptionally clear example of the profound influence *Silent Spring* exerted on the genre. In Wylie's final published work, *The End of the Dream* (1972), he shifts dramatically from his previous jeremiads against nuclear weapons to an equally dire warning about the overuse and abuse of industrial pollutants. Like Cloete's "The Blast," *The End of the Dream* is framed as a historical document rather than a novel. Ostensibly written by Will Gulliver on behalf of the Foundation for Human Conservancy, it consists of a series of vignettes bookended by "Editor's Notes" and cover letters. Gulliver quickly delivers on the Swiftian social satire suggested by his name. His reports include an enclave of ignorant, selfish rich people (and their slave labor) who are killed by the collapse of the illegal golf course they have built over a toxic landfill, and cheap TV dinners that cause an intestinal buildup of deadly methane gas and the explosion of some unlucky consumers. Monstrous algae escapes from a government research facility, which had been testing its application as a weapon to deploy against enemy water supplies. In an echo of the British smog stories of the turn of the century, New York City suffocates under a cloud of toxic gasses, committing a "massive self-execution" because city officials were unwilling to disrupt the Christmas shopping season by announcing an

evacuation (183). These fragments of the “historical record” are intended to illustrate the extended timeline and scale of the ultimate environmental apocalypse, the number of warnings humanity had of its approach, and the consistency of its short-sighted choices to ignore those warnings.

Wylie dramatizes the failure of science’s capacity to predict and prevent environmental disaster. “The past half century had shown that, however fast the scientists exerted their efforts toward anticipating new perils, others of unknown deadliness were overlooked or even not detectable,” he writes. “The havoc man had wreaked on his planet was so immense and of so many sorts that assurance of safety had become absurd” (14). Those scientists and agencies that do attempt to speak out are quickly shouted down by industrial lobbyists. Wylie also directly references the publication of *Silent Spring* as one such unheeded warning. “A scientist-author, Rachel Carson, had dramatized the perils these [chlorinated hydrocarbons] involved in a book called *Silent Spring*,” Will Gulliver writes. “The book had been ridiculed by innumerable colleagues, by pesticide chemists, manufacturers and persons with interests in agriculture” (36). The metatextual significance of this statement is two-fold: first, Wylie aligns critics of *Silent Spring* with the immoral selfishness of a scientific practice beholden to industrial interests; second, it suggests that SF *does* take the warnings of *Silent Spring* seriously. Like Carson, Wylie and like-minded authors are also in the business of “dramatizing perils” for their readers.

The problem, however, is not merely an issue of corporate conspiracies of silence. Gulliver transcribes the testimony of a scientist who had repeatedly warned the press as well as city, state, and federal officials that the Cuyahoga River was dangerously flammable. After the river explodes, killing thousands, he rails that “Most all of us [scientists] have been ridiculed as well as vilified in the press and on TV. The public doesn’t know which side to trust but it prefers

the side that promises more jobs, higher wages, cheaper products” (160). After each new catastrophe, the public cries out for reform and legislation, and then, when faced with the inconvenient sacrifices necessary to carry out adequate reforms, opposition to polluting industries fades. The sheer scale of the problems and the scientific data surrounding them also simply overwhelm most Americans. Faced with the complex and sophisticated problems of chemistry and environmental science, everyone – including state and federal government – is eager to defer to the recommendations of scientific “specialists,” many of whom are beholden to the same industrial and corporate interests that have created the problems in the first place. This combination of mental laziness and faith in science “assumed that people who did have the knowledge were managing the situation well. Nothing could have been more mistaken” (43). In a final, significant shift from his earlier work, Wylie presents the Red baiting of Cold War politics as a tragic distraction from the truly important issues of environmentalism. At one point the leader of the Foundation for Human Conservancy, Miles Standish Smythe, says,

“Funny how nearly everybody, even then, was under a compulsion to believe what was happening must be the result of Communist action. And even when the USSR began to suffer identical or similar calamities. The Red mania did a lot of damage to our own work. Gave people a whipping boy – and so, a rationalization for that endless notion that they could eat their cake, have it, feed it to their children, and the kids would still have it too.” (65)

The explosion of Cuyahoga River in Cleveland is, for example, initially assumed to have been caused by an atomic bomb: “The presumption was reasonable. No known agent of blast except the sort used on Hiroshima and Nagasaki at the end of World War II could have caused such massive and far-ranging devastation” (154). While Carson conflates nuclear and chemical threats

to educate her readers, Wylie goes further: the fear of nuclear attack is a distraction from the true threat of industrial pollution, which can cause equal (and eventually much greater) destruction.

Humanity is humbled only when it is too late to effect significant, life-saving changes. After a combination of atmospheric pollutants causes a worldwide rice blight and the resulting famine kills billions, “mankind got the point. It had taken a ninety per cent extermination, in a series of incalculably grim calamities, to shatter man’s deluded attitude toward his special nation and its political and economic system and, above all, to erase man’s near indelible idea that he existed above and outside nature and could do with and to nature as he pleased” (13). In the early sections of *The End of the Dream*, the reader finds echoes of the hopeful misanthropy of scientific romance. Will writes despairingly that future generations will never believe the willful blindness and selfishness of contemporary society, of its “resentment, ennui, and boredom” when faced with the sacrifices, or even mere inconveniences, required to save their own lives and those of their fellow men and creatures (48). The “great men” of the Foundation and its new post-apocalypse world order represent, perhaps, worthy replacements for the selfish humans who destroyed their own world. In one of his “Editor’s Notes,” Will Gulliver writes:

He [mankind] blew himself up not by his explosion of knowledge but by the way he used it.

Man was still, then, a child.

Perhaps he can now achieve maturity. (92)

Even this cautious optimism is denied by the conclusion of *The End of the Dream*: the infant capital of the slow and painful reconstruction of North America is abruptly and mysteriously wiped off the map by unknown forces. In the novel’s final image, the great Miles Smythe,

founder and prophet of the Foundation for Human Conservancy, weeps for the loss of Will Gulliver, the last chronicler a civilization doomed to extinction by its short-sighted misuse of its science and technology.

Greybeard

Brian Aldiss's 1964 novel *Greybeard* is, like *The End of the Dream*, a bridge narrative between the nuclear and chemical visions of looming environmental apocalypse. Aldiss's narrative, however, is much more complex and nuanced than Wylie or Wilhelm and Thomas's responses to the *Silent Spring* paradigm of apocalypse. Aldiss also returns to the topoi of bodies and reproduction as sites of toxic anxieties. In *Greybeard*, both the threat and its causes are diffuse and mysterious, but the narrative retains the easily dramatized militarism of most Cold War fiction. Algernon "Algy" Timberlane and his wife Martha are survivors of "the Accident," a world-wide event in 1981 whose nature is left vague but has effectively rendered the entire planet sterile. By the time the novel opens sometime in the next century, the average age of the population is in the high seventies.

The sterility is not complete; a vanishingly small number of children are born, almost all of them "defectives – monstrosities beyond your conception" (*Greybeard* 68). In flashback chapters, Algy participates as a foot-soldier in "Project Childsweep," an international effort to locate and take custody of these children. The Project displays the same conflicting impulses as the parents of *Seeds of Life* and "That Only a Mother" when faced with the choice between childlessness and monstrous offspring; the uncomfortable idea that the human race is better off

extinct than continuing only in a diminished and disfigured form appears repeatedly. In one conversation, Algy's cynicism has it out with his friend Charley's naïve Christian charity:

“Ninety-six point four per cent of the children we have picked up on Operation Childsweep had external or internal deformities. ... the Western world spent fifteen years legally killing off all the little monstrosities born of the few women who weren't rendered out-and-out sterile. Then our quote advanced thinkers unquote got the idea that the monstrosities might, after all, breed and breed true, and restore a balance after one generation. So we go in for kidnapping on an international scale.” (143)

Charley objects to Algy's characterization of the children as “monstrosities” valuable only as breeding stock: “No, no, you can't say that,” he exclaims. “They were still of the human race, their souls were still immortal. Their legal murder was worse than madness. But after that we did come to our senses and start free clinics for the children of backward races, where the poor little wretches would get every care – ” (143). In the end, Project Childsweep is merely an extension of a militaristic white colonialism that sends storm troopers to seize the “children of backward races,” often killing them in the attempt to “rescue” them from their families. After a badly botched mission that leaves two children dead, Algy realizes that “human hands were turned against children in practice, if not in theory. He himself had fired at the first child he had been close to! Perhaps there was some kind of filicidal urge in man forcing him to destruction” (244). This gap between theory and practice reveals a larger system of violence masquerading as rational objectivity: the actual sterility in the novel is almost beside the point in the larger context of callous destructiveness. The Accident is merely the latest iteration of paternalistic science

sacrificing its offspring on the altar of inquiry, a “filicidal urge” going back to Rappaccini and Victor Frankenstein.

Greybeard is noteworthy for its depiction of nuclear science as savage and juvenile, rather than rational and seductively modern. Algy’s wife Martha reframes the Accident explicitly in the realm of masculinity run amok:

It was really the generation before hers that was most to blame, the people who were grown-up when she was born, the millions who were adults during the nineteen-sixties and seventies. They had known all about war and destruction and nuclear power and radiation and death – it was all second nature to them. But they never renounced it. They were like savages who had to go through some fearful initiation rite. Yes, that was it, an initiation rite, and if they had come through it, then perhaps they might have grown up into brave and wise adults. But the ceremony had gone wrong. Too frenzied by far, it had not stopped short at circumcision; the whole organ had been lopped off. Though they wept and repented, the outrage had been committed: all they could do was hop about with their deformity, alternately boasting about and bemoaning it. (58)

Martha seems to turn to the same despairing explanation Judith Merrill’s Maggie uses when faced with her own husband’s filicidal urge: “man’s childish impetuosity.” Martha goes further, though, depicting impotence not merely as a divine punishment for scientific hubris, but a more fundamental destructive urge in all rites of masculinity. The shocking castration metaphor she employs makes this destructive connection between technology and the body visceral in a way that the previous texts examined in this chapter seem content to leave between the lines. Perversely, the “deformity” of castration, here a paradoxical indicator of the power of the

destructive rite itself, is still something to be boasted of – a marker of power even after that power has been turned back upon its creator.

Aldiss ends *Greybeard* on a hopeful note, with the discovery of unblemished “wild” children who have been living like feral creatures in the restored wilderness of England. Algy, after recovering from his initial shock, notes admiringly that “It was clear at least that the drive to self-preservation was strong in the new generation They were wary of man. By their dress it was clear they identified themselves more with the animal kind than with the crazy Methuselahs who still inhabited the earth” (244). In this, as in earlier “Last Man” apocalypses such as Cloete’s “The Blast” or George R. Stewart’s *Earth Abides* (1949), the earth is redeemed by the destruction of human civilization: “The world would go on; man might die, but the earth still yielded up its abundance” (32). In its conclusion, *Greybeard* engages in a fantasy of a “pure” nature, free of human violence and the scientific and industrial hubris that is so closely linked to that violence.⁵⁶

Silent Spring’s metaphoric linkage of environmental degradation to militarism also broadens from referencing the specific geopolitical conflict of nuclear war to a more general “war against nature.” In the chapter “Nature Fights Back,” Carson writes:

The “impossible” is now happening on two broad fronts. By a process of genetic selection, the insects are developing strains resistant to chemicals.... But the broader problem...is the fact that our chemical attack is weakening the defenses inherent in the environment itself, defenses designed to keep the various species

⁵⁶ Richard Cowper’s *Twilight of Briareus* (1974) presents a more bizarre variation on this theme of a more peaceful humanity emerging from near-extinction; radiation from a supernova renders humanity sterile, and passing aliens use the opportunity (and LSD) to impregnate Earth’s women with a peaceful “twilight generation” endowed with extra-sensory perception.

in check. Each time we breach the defenses a horde of insects pours through.
(246).

Correspondingly, narratives centered on a wronged nature seeking violent revenge against humanity appear in SF with increasing frequency.⁵⁷ Frank Herbert's *The Green Brain* (1966) makes Carson's avenging "horde of insects" one of its central characters: driven to desperate measures by humanity's increasingly extreme use of pesticides, the world's insects unite in a collective consciousness that is capable of physical action and instantaneous global communication. Directed by "the Brain," worker insects wage war against developers – called, in a succinct bit of Orwellian double-speak, the "International Ecological Organization" – in the Brazilian rainforest. In a literalization of Carson's line in *Silent Spring* decrying industrial and agricultural chemistry's "crusade to create a chemically sterile, insect-free world," the IEO wants to eradicate the insect life that currently makes the area unlivable, a strategy that already has been carried out in China (Carson 12). Successfully sterilized areas are called, ironically, "the Green," while everywhere else is "the Red."

The organization's short-sighted but efficient destructiveness is contrasted to the comparatively ineffectual environmentalism of groups collectively referred to as "Carsonites." An IEO employee complains "It's all well and good for *them* to refuse to join us in the Ecological Realignment; they don't have millions of mouths to feed" (Herbert 50). This objection mimics the rhetoric of the "Green Revolution," a series of agri-scientific initiatives conducted from the 1940s until the late 1970s, and most markedly during the 1960s. This movement sought to create increased agricultural production around the world, most notably through the use of

⁵⁷ The "big bug" movies of Cold War B-grade cinema, in which irradiated vermin attack humanity, provide one template for this narrative – see Bellin's "Us or Them!": *Silent Spring* and the 'Big bug' Films of the 1950s."

monoculture, hybridized seeds, synthetic fertilizers, and pesticides. The modern system of conventional (that is, not organic) agriculture is profoundly dependent on the use of artificial fertilizers and pesticides, which are necessary to limit the high levels of pest damage and soil depletion that inevitably occur in monocropping. Almost every one of those substances is toxic.⁵⁸ The central importance of pesticides to the Green Revolution is apparent in an anti-Carson story of famine-inducing insect plagues, written on behalf of agri-business giant Monsanto (then the Monsanto Chemical Co.) and sent out to thousands of reviewers, editors and farm and gardening writers to counter *Silent Spring*. In “The Desolate Year,” the failure to use pesticides results in an insect plague that devastates America and causes global famine.⁵⁹

In *The Green Brain*, the dark secret of the “success” of the anti-insect campaign in China is quickly revealed. Without insect life, China’s soil inevitably “goes barren. Nothing helps it – fertilizers, chemicals, nothing.... We face such a famine as history has never seen” (76). Even with the dramatic evidence of the program’s dangers, financial and ideological interests keep the campaign to turn “the Red” of the Amazon “Green” rolling along. Pushed past the limit of their collective patience, the insects’ unified “Brain” colonizes humans, forcing them to acknowledge their interconnectedness with the natural world. Hebert’s novel is, in its way, as simplistic and violent a polemic as Philip Wylie’s civil defense work; the industrialist villains are so entirely evil that the final “enslavement” of humans to the insect hive-mind is presented as a just and reciprocal punishment for humanity’s collective hubris.

The anti-pastoral apocalyptic vision of *The Green Brain* appears throughout the now-classic ecological apocalypses of SF published in the late 1960s and 1970s, including John

⁵⁸ For an accessible scientific discussion of how these pesticides work, and their consequences for human and ecological health, see *Ecological Impacts of Toxic Chemicals*, Sánchez-Bayo et. al.

⁵⁹ Jack Doyle’s “Power in the Pen, *Silent Spring*: 1962,” at PopHistoryDig.com collects a digital archive of documents related to *Silent Spring*, including “The Desolate Year.”

Brunner's *The Sheep Look Up* (1972), Harry Harrison's *Make Room! Make Room!* (1966, adapted to film in 1973 as *Soylent Green*), and Ursula K. Le Guin's *The Word for World is Forest* (1976). While the moral outrage of the ecological apocalypse dims somewhat over time, its themes continue to manifest in SF through the 1980s and 1990s. Its anti-industrial and anti-corporate message remains especially resonant through the closing years of the twenty-first century; particularly in the cyberpunk subgenre which rises to prominence in the late 1980s, dystopian post-industrial settings and sinister mega-corporations feature prominently in the SF imaginary. The aesthetics of landscapes ruined by pollution and toxins also reappear with regularity; the anthology *Wastelands* (2008) collects many excellent short stories in this vein, including Orson Scott Card's "Salvage" (1986) and Paolo Bacigalupi's "The People of Sand and Slag" (2004).

Gain

Carson's rhetoric, itself inflected with SF tropes and conventions, was incorporated into mainstream fiction and memoir as readily as into SF. Carson's successful transcendence of the previously strict stylistic separation between "objective" scientific writing and "subjective" literary narration lowered the barrier between science and literature in a way that had previously been the sole province of SF. In the Introduction to this dissertation, I discuss several examples of this kind of "toxic novel," including Don DeLillo's *White Noise*, which stage *Silent Spring*'s central theme of insidious chemical threats. Here, I focus on Richard Powers's 1999 novel *Gain* as an example of the continuing influence that this rhetoric of toxic exposures exerts in mainstream fiction. In the novel, synthetic chemical toxins, in the form of household and garden

chemicals and the botanically derived chemotherapy drug Taxol, are both the possible cause of and cure for protagonist Laura Bodey's ovarian cancer.

Powers has called himself "a top-down writer," with the "top" being a formal narrative structure and the bottom being character development; to him, the emotional power of fiction most often emerges from the "formal rightness" of a highly structured "aerial view," rather than a reader's identification with the characters (Bikerts 60). In this model, the "aerial view" of *Gain* is a vision of the "technological acceleration" of the Clare Corporation and its myriad chemical products; however, in focusing more than half the novel through the point of view of Laura Bodey, *Gain* is, in Powers's opinion, an "almost compensatory attempt to go back in and re-imagine the problems from the bottom-up" (61). In this respect, *Gain* is deeply influenced by the toxic memoirs of the 1990s; it departs from these works in that it is less interested in tracing the causes of Laura's illness than in exploring how her subjective experience of her cancer embodies a larger conceptual breakdown of the boundaries among body, technoscience, and environment.⁶⁰

As in many of Powers's novels, the plot of *Gain* follows multiple narrative strands, skipping forward and backward across centuries to interweave the story of the rise of the Clare corporation with the life of the contemporary Lacewood realtor Laura Bodey. Powers repeatedly portrays Clare as a progressive company, one that sets up both advanced research laboratories and profit-sharing schemes for its workers. Clare's reputation was built on claims of "natural purity" and "native virtue," embodied in its Native Balm soap, which contains extracts from a tropical plant brought back from a Pacific island by one of the Clare brothers. This plant serves as the modern Clare logo. Over time, however, the illustration of the plant becomes so stylized

⁶⁰ Heather Houser's essay "Wondrous Strange: Eco-Sickness, Emotion, and *The Echo Maker*" analyzes a similar narrative of boundary-destabilizing illness (in this case, a rare brain disorder) in Powers's 2006 novel *The Echo Maker*.

that it “looks like nothing that grows on earth” (295). In the same way, Clare’s associations with purity and health have become divorced from its actual practice; the true foundation of Clare’s fortune is its own chemical wastes.

For all its corporate claims to nobility and its advertising’s emphasis on purity, Clare owes its success to continually finding new ways to refine and repurpose the industrial wastes from its soap and detergent divisions. The company uses its economic and cultural clout to force the small Illinois town of Lacewood, where its agricultural division is headquartered, to balance employment against pollution and cancer. Powers traces in exhausting detail the brutal course of Laura’s treatment for ovarian cancer and the gradual growth of her suspicions that her cancer has been caused by the toxic environment and products created by Clare. At the beginning of her chemotherapy regimen, she takes comfort in the fact that Taxol, one ingredient in her cocktail of chemo poisons, is derived from tree bark. “How can tree bark hurt you?” she thinks. “Tree bark is 100 percent natural.... The completely natural toxin is set to drip into her for the next twenty-four hours” (112). Later, Laura finds out that the Taxol in her drip is in fact a synthetic version of the botanical original, developed in a lab to prevent deforestation. She is shocked and demoralized as she realizes “what precarious cocktails we all are” – that her body is not the “100 percent natural,” autonomous, sovereign entity she had assumed (130). At breakfast, faced with crippling nausea and the proudly healthy “archaic grains” of her daughter’s breakfast cereal, she thinks that “Until getting sick, she took edible things at face value. Now they gang up, show her what’s under the hood” (135). Her cancer forces her to face her body’s susceptibility to unseen toxins. She takes an inventory of the contents of her home:

As far as she can make out, nothing is safe: We are all surrounded. Cucumber and squash and baked potato. Fish, that great health food she’s been stuffing down the

kids for years. Garden sprays. Cooking oils. Cat litter. Dandruff shampoo. Art supplies. Varnish. Deodorant. Moisturizers. Concealers. Water. Air. The whole planet, a superfund site. Life causes cancer. (284)

Still, Laura resists the idea that these artifacts of consumerism, many produced by Clare, are responsible for her ovarian cancer. Her daughter and ex-husband urge her to read the EPA's Toxic Release Report for their area and to join a class-action lawsuit against Clare, but Laura protests that "she cannot sue the company for raiding her house. She brought them in, by choice, toted them in a shopping bag" (132). This denial is both typical of the toxic novel and an instance of risk society mentality. Laura feels herself complicit in her own cancer – she accepted, however subconsciously, the risks of buying, using, and consuming synthetic chemicals and living in a factory town. She also feels helpless in the face of the sheer ubiquity of toxic exposure. In the early stages of her chemo, Laura receives a fundraising letter from the Cancer Research Institute. The letter advises her to "make healthy choices" and limit her exposure to toxic chemicals:

Don't expose yourself to toxic chemicals at home or at work. There's the catch. They might as well say: Don't get cancer. Well, she hasn't exposed herself. She hasn't, knowingly or otherwise, as far as she knows. She hasn't *been* exposed. No Love Canal under the house. No Three Mile Island just across the river. Whatever she's getting by chance or proximity is no more than anyone else in the world is getting. (283)

Even her ex-husband, who is convinced from the start that Laura's cancer has been caused by Clare's products, cannot see a way out of the risk they've collectively assumed. On a visit to

Clare's headquarters, he thinks, "Couldn't go back now, if we wanted to. And who wants to? No getting along without the magic additives, the super-pesticides. Especially now that we've bred a race of super-pests with them" (258). In the end, it is exactly these indispensable "magic additives" and "super-pesticides" that push Laura out of her self-abnegation.

Laura has spent years cultivating a small garden in her backyard, a garden in which she takes immense pride and in which she has always found a peaceful refuge from the stresses of her life. She sees the name of "her" herbicide on a list of Clare products known to contain carcinogens, and finally feels a deeply personal violation: "Her plot of earth. Her flowers. Sue them, she thinks. Every penny they are worth. Break them up for parts" (320). She is able to direct the responsibility away from herself, the consumer of toxins, and onto the producer of toxins only after her lovingly tended garden, her "natural" sanctuary from unnatural modern life, is implicated in her illness. Like Beatrice Rappaccini or Elsie Venner, Laura's identity as a woman is bound up in her relationship to a carefully cultivated nature. Unlike those characters, her body's poisons give her only moral, rather than physical power; the toxic Taxol cannot save her from the effects of the toxins already in her system. Laura weakens, wastes away, and finally dies.

While *Silent Spring* is undeniably a crucial moment in the development of the toxic narrative, it is important to appreciate that Carson is writing as part of an established narrative tradition. Carson's deployment of a highly skeptical stance regarding uncritical acceptance of scientific marvels is one of the hallmarks of science fiction, and Carson's often speculative tone strengthens this generic alliance. While *Silent Spring*'s use of the apocalyptic imagery of nuclear

rhetoric and the SF technique of narrative extrapolation have been well-documented by Killingsworth and Palmer, Laurence Buell, Ralph Lutts, and others, this chapter has demonstrated the ways in which science fiction both primed readers for *Silent Spring*, and then responded to it in turn. By drawing clear connections between the intimate personal disasters of illness, cancer and sterility and global ecological disasters, *Silent Spring* popularized and extended the toxic narrative that had long been present in SF.

CHAPTER FOUR

COUNTER-NARRATIVES: POWER AND IMMUNITY

SF has always displayed apocalyptic tendencies, seeming to revel in the destruction of cities, cultures and civilizations just as often as it celebrates the creation or discovery of new ones.⁶¹ According to John May's survey of apocalyptic literature, such novels always contains at least two elements – catastrophe and judgment – and very often proceed to a third: renewal (38). In this chapter, I examine a branch of the toxic narrative in SF that constitutes a counter-narrative of power and immunity; these narratives push back against the alarmist voices and focus on the renewal that follows Armageddon, or on immunity or resistance which render exposures and disasters benign.

“Redeemed” landscapes

Silent Spring popularized the concept of bodies and landscapes as irredeemably bound up with toxins; Carson's book shifted environmental discourse from a rhetoric of depletion to one of deformation, giving rise to what Frederick Buell calls “post-mortem” nature writing. While drawing heavily on the tradition of American “back to the land” narratives – the classic example is, of course, Henry David Thoreau's *Walden* (1854), but more recent works include Edward Abbey's *Desert Solitaire* (1968) and the story of Christopher McCandless in Jon Krakauer's *Into the Wild* (1996) – this new genre focuses on corrupted landscapes rather than pristine or

⁶¹ For more on the eschatological tendencies of SF, see John May's *Toward a New Earth: Apocalypse in the American Novel* (1972). James Gunn's introduction to his *The End of the Dreams* (1975) also provides a brief but informative discussion of the topic.

inspirational retreats. These narratives fuse the American wilderness ethos with sober explorations of devastated landscapes.⁶² They suggest that what is lost can be recuperated; that while constructions of “wilderness” as pristine and untouched spaces are no longer tenable, the alternative is not a simple dialectic between the pristine and the toxic but rather a spectrum along which recovery and beauty can occur in new and interpenetrative ways.

These representations of “post-wilderness” spaces are often arrestingly visual. Consider William Cronon’s photo-essay on the Rocky Mountain Arsenal Park, included in the anthology *Uncommon Ground*. This “album” is a collection of excerpts from a 1991 wall calendar and clippings from the *Denver Post* celebrating a former munitions dump as “The Nation’s Most Ironical Nature Park.” Located a few miles outside Denver, Colorado, the Rocky Mountain Arsenal was built during WWII for the manufacture of chemical weapons, and was later used by Shell Oil to produce pesticides. It was abandoned in the 1980s and subsequently declared one of the most toxic EPA Superfund sites in America. The area’s toxicity insulated it from the booming urban and agricultural developments surrounding Denver – among other barriers to construction, its Superfund Remediation Plan called for the removal of almost 3.5 million cubic yards of contaminated soil. Set apart by its toxic buffer zone, the Rocky Mountain Arsenal became an incredibly rich green space and a refuge for endangered animals and threatened native flora. In 1992, Congress passed the Rocky Mountain Arsenal National Wildlife Refuge Act, formally designating the site as worthy of official conservation.

The R.M.A.’s paradoxical juxtaposition of toxicity and nouveau-wilderness “raises all sorts of interesting questions about what people mean when they use words like ‘natural’ and

⁶² Jean Hegland’s contemplative post-apocalypse *Into the Forest* (1996) is an excellent example of fictional “post-mortem” nature writing.

‘unnatural,’” Cronon writes (57). In one of the excerpts in the essay, the sales copy on the “Rocky Mountain Arsenal 1991 Calendar” places the RMA’s toxic past in the context of a pristine prehistory (“After a million years a rolling prairie, dominated by native grasses and bison, succeeded the ancient sea...”) and the promise of a “cleaner” future. It imagines the site in a traditionally dualistic way: it was pristine wilderness, it was contaminated by industry, but it will be “renewed” and accessible as a picnic site for Denver urbanites. In 2010, after 23 years on the EPA Superfund list and a \$2.1 billion cleanup funded by the US Army and Shell, responsibility for the site was transferred to the U.S. Fish and Wildlife Service for development as a park and wildlife refuge. The RMA is positioned for the general public as a victory over toxicity by both natural processes and human agency. The city of Denver’s official tourism website touts the park as an area that has “made a remarkable recovery from a toxic piece of land to a fully rehabilitated natural wonder.” This cheerful summary omits the fact that dozens of underground monitors still keep track of potential toxic seeps into groundwater, that the U.S. Fish and Wildlife Service and the Army maintain landfills and soil covers within the park where hazardous wastes are managed, and that site reviews will be conducted every five years to ensure that the cleanup remains effective.

This paradoxical model of the toxic disaster site *cum* nature preserve can also be observed at the site of the Chernobyl Nuclear Power Plant in Ukraine. After the catastrophic meltdown of Reactor Number Four over ten days in 1986 (one of the two worst nuclear accidents in history), the Soviet government established the Chernobyl Exclusion Zone. Officially called the “zone of alienation,” this area initially extended nineteen miles in all directions from the plant; it now encompasses more than 1,600 square miles of northern Ukraine and southern Belarus. Contaminated villages and structures were bulldozed, and the residents relocated.

Although the Ukrainian government opened parts of the area to tourists in 2011, officials estimate the area will not be safe for human habitation for another 20,000 years (Higginbotham).

In contrast to the dystopian connotations of its name, the “zone of alienation” now teems with life. Studies conducted from 2005 to 2007 by the Belarussian government found mammal diversity and abundance equal to that of a protected nature reserve, with rare species including bear, lynx, river otter, and badger as well as introduced herds of European bison and Przewalski’s horses. Bird diversity is even richer and includes 61 rare species. Whooper swans—never before reported in the region—now appear regularly. In a book on Chernobyl’s wildlife, Mary Mycio writes that “the idea that the world’s biggest radioactive wasteland could become Europe’s largest wildlife sanctuary is completely counterintuitive for anyone raised on nuclear dystopias” (11).⁶³ Mycio’s remark misses the mark slightly; as the second chapter of this dissertation has shown, many “nuclear dystopias” actually incorporate a strong counter-narrative of renewal and revitalization. Descriptions of unlikely sanctuaries like the Rocky Mountain Arsenal or Chernobyl confirm that the toxic narrative has produced a model of recuperative nature – a return to an idealized, pre-industrial nature – that seeks to negate the toxic threat rhetorically as well as scientifically. This strategy appears even more clearly in SF that envisions recuperation, both environmental and cultural, as a consequence of disaster.

Alas, Babylon

The problematic representation of catastrophe as a way to wipe the slate clean and start fresh occurs on both ends of the ideological spectrum of SF, from the progressivism of Wells’s

⁶³ For more on this fascinating area, see Adam Higginbotham’s article “Is Chernobyl a Wild Kingdom or a Radioactive Den of Decay?” in *Wired*.

Children of the Food to the masculinist atavism of Cloete's "The Blast." The idea that the world will be better off without the vast majority of its human inhabitants seems fundamentally misanthropic, but it resonates through SF. This romanticization is not a new development; in a survey of nuclear fiction that spans almost one hundred years, Martha Bartter notes that "atomic war has traditionally been presented as both obvious disaster and as secret salvation" (148). As in the Rocky Mountain Arsenal or the Chernobyl exclusion zone, the toxic wasteland can constitute "paradise regained." The theme was especially prominent during the Cold War; long after the grim effects of fallout and radiation sickness became widely known and even after the advent of exponentially more destructive "super-bombs," a tendency to romanticize apocalypse as renewal runs through much of the nuclear fiction of the early Cold War era. In his controversial and widely-read treatise *On Thermonuclear War* (1960), for example, military strategist and physicist Herman Kahn presents possible outcomes for nuclear war based on two assertions: first, that a global nuclear war is possible, and second, that such a war is winnable. Kahn believed that "even though the amount of human tragedy would be greatly increased in the postwar world, the increase would not preclude normal and happy lives for the majority of survivors and their descendants":

The postwar restoration may be even faster, not only because so much survives all but the most destructive wars, but also because we are likely to work harder and consume less.... We can imagine a renewed vigor among the population with a zealous, almost religious, dedication to reconstruction, exemplified by a 50-60-hour work week. (79)

Kahn dismisses as mere negativism the suggestion that survivors facing unprecedented destruction – including radioactive contamination, millions of dead and dying, and the sudden loss of vital supplies and services – might respond with something less than “renewed vigor.”

Kahn’s vision of “normal and happy lives” for virtuous and civic-minded Americans “in the postwar world” has clear parallels in many of the survivor stories of Cold War SF. Pat Frank’s *Alas, Babylon* (1959) is by far the most popular of these optimistic works; it was reprinted over thirty times between 1959 and 1975, and an electronic edition currently available on Amazon.com is their 23rd-best seller in the category “American Classics” (Amazon). It appealingly adapts the SF template of the individualist Last Man survival story to a community setting, in which disparate groups work together for the general good of a post-apocalyptic society. *Alas, Babylon* is also an extreme example of a certain school of conservative thought during the 1950s “that seems almost to revel in the destruction of the modern American system,” imagining a post-nuclear-holocaust small town “as a kind of laissez faire utopia” (Booker 86). In *Alas, Babylon*, Frank depicts nuclear war as ultimately surmountable by grit and frontier ingenuity, and even as a positive phenomenon that encourages these virtues and weeds out those who are unwilling to, as Kahn puts it, commit to “a 50-60-hour work week.”

The novel’s protagonist, Randy Bragg, is a failed local politician and a descendant of the founders of the small Florida town of Fort Repose. His brother, Mark, is a military intelligence officer with Strategic Air Command; Mark suspects that a Soviet nuclear strike is imminent and sends his wife and two young children to Fort Repose. He warns Randy of his suspicions via telegram, using their childhood code words for “disaster”: “Alas, Babylon.” Randy quickly cashes out his savings at the local bank to stock up on groceries, liquor, and ammunition, and retrieves Mark’s family from the airport. He also quietly warns the town doctor, Dan Gunn, and

the Henrys, a family of black tenant farmers on his family's property. The next day, "The Day," the atomic bombs drop. Although Fort Repose is spared, death and chaos erupt across the country and threaten the central cast of characters, which now includes Randy's fiancée Lib McGovern, her parents, and three other neighbors.

Frank keeps descriptions of destruction and loss of life at arms-length; immediately after the attack, Randy stares "at the glow to the south," where Miami is burning. "Randy was witnessing, from a distance of almost two hundred miles," Frank writes, "the incineration of a million people" (Frank 83). After this, the specifics of the attack and its aftermath become even more vague. Although Randy is able to monitor the airwaves over a ham radio operated by his neighbor Admiral Hazard, "Of the national situation, there was no word at all" (95). In fact, *Alas, Babylon* is relatively unconcerned about the massive loss of life associated with the nuclear attack; the focus remains squarely on Fort Repose as a bucolic space exempt from nuclear danger. Mark's probable fate is quietly mourned by his brother and wife, who otherwise remain stoic. Randy's niece Peyton is blinded by the flash from the blasts, but even this injury is temporary and easily cured with rest and aspirin. With the exception of a few looters and panicky hotel guests, the people of Fort Repose are generally calm and resolute. Randy, in fact, seems less concerned about the end of civilization than the loss of luxury items like steak, whiskey, and safety razor blades. This tacit equation of "culture" with "consumerism" is no coincidence; Randy's immediate response after receiving Mark's "Alas, Babylon" telegram is not to warn the town, but to go shopping. Frank presents this not as a callous disregard for the wellbeing of one's fellow human beings, but as a clever and prudent far-sightedness. Randy's only regret is that he forgot to purchase salt and canning jars before the storekeepers marked up their prices.

Despite this pro-consumerist message, Frank reserves his ire not for the Communists who have bombed the country, but for Americans who fail to react appropriately to the end of the world. Like Philip Wylie, Frank ferociously attacks greed, bureaucracy and complacency, especially in the form of the Civil Defense Administration. In *Alas, Babylon*, almost all official organizations and systems collapse within hours of the first blasts; this failure is emblematic of “Frank’s (right-wing) conviction of the inability of the federal government to deal adequately” with true crisis (Booker 86).⁶⁴ The duly appointed Civil Defense leader for Fort Repose is a self-serving politician who never distributed Civil Defense booklets because they were “too gruesome.” Drug addicts raid the pharmacy and shoot the town’s sheriff when he tries to stop them. Formal authority is quickly replaced by a more ad-hoc system in which characters are valued according to (and quickly become identified with) their practical skills. The Henrys farm, Admiral Hazard works the radio, Dan Gunn patches up the sick and wounded, and so on; the town’s librarian even enjoys a renewed importance as people deprived of television, movies, and magazines return to the town’s once-neglected library. Those without useful skills quickly die off. In a moment of rather heavy handed anti-elitism, for example, the town’s banker shoots himself as soon as he realizes that money has become worthless.

In Frank’s model of post-apocalyptic right-wing populism, Randy emerges as a new and charismatic leader. As a direct descendent of the town’s founder, he displays an innate sense of *noblesse oblige* as he quickly and easily assumes leadership not just of his core group, but of the town at large. When he learns that the new President has declared military law, Randy – a lieutenant in the Army Reserves – declares himself the de facto commander of Fort Repose. The townspeople offer no objections; if anything, they accept Randy’s leadership with gratitude and

⁶⁴ Frank’s earlier novel *Mr Adam* (1946) takes a similarly cynical view toward government.

relief, and he is able to run the town with a combination of common sense and martial bravado. Frank's forthright endorsement of what is essentially a military dictatorship critiques the apparent loss or compromise of masculine virility in post-war America; early in the novel, Mark Bragg declares that what America needs are "Bold men, audacious men, tenacious men.... Ruthless men who will fire the deadheads and ass-kissers" (16). Almost all of the positive male characters have noticeably martial names – Bragg, Gunn, Hazard, McGovern – and even Randy's fiancée Lib is described as "like a fine sword, slender and flexible, but steel" (174).

Although there are shortages and hardships, everyone seems content with the new order. Life after nuclear war is presented as a tale of survival not in the grim apocalyptic mode, but in the lighter tone of the Crusoe story (or Robinsonnade), which typically converts the "misfortunes of catastrophe into high adventure and in the process transform the landscape of disaster into a rural frontier where survival depends on adapting to the limitations of a world abruptly divested of technology" (Porter 41). *Alas, Babylon* reduces unthinkable disaster to a series of "discrete, manageable and essentially practical problems" (Seed 1999, 62). When highway bandits attack and rob Dan Gunn, Randy organizes an armed posse to ambush and summarily execute the criminals. When the community runs out of salt, Randy consults his ancestor's account of settling the region in the 1800s and locates an entire beach of pure, white salt. The fish stop biting (because of a heat wave, rather than radiation), but Peyton saves the day by using the librarian's goldfish as bait. Where most post-apocalyptic narratives go out of their way to depict physical and psychological suffering, "the characters in this story generally carry on as though at summer camp" (Porter 44). They fish, hunt, read and research at the library, build a still to make moonshine, and learn to grow their own food (although the Henrys still do almost all of the actual labor). Everyone has a role in the community, and the resulting society is efficient and

harmonious; the only threats come from one-dimensional drug addicts and highwaymen, far beyond the pale of the Fort Repose establishment.

While Frank repeatedly makes the point that racial and class distinctions are unnecessarily divisive in the new postwar world, the novel methodically reinforces conservative family structures. Although individual pairings and families are subsumed to the needs of the community, rather than the single home, this Cold War communalism maintains a diminished role for women and children. Unlike the female-centered domestic stronghold of Merrill's *Shadow on the Hearth*, in *Alas, Babylon* Randy is the undisputed head of the house around which the characters' lives orbit. The women, while resilient and resourceful, are either spinsters or love interests; even then, the romantic possibilities of a house filled with single men and women are quickly foreclosed. Helen makes sexual advances to Randy, but Frank makes it clear that her aggressive sexuality is only the temporary derangement of a woman overcome by worry; in a moment of irrational grief, she mistakes Randy for his brother, her dead husband. She is a loose end tied up in the novel's denouement by marrying her to Dan Gunn. Randy confronts his bachelor ways in the form of Rita, an old girlfriend, but the novel dismisses her as a hot-blooded Latina temptress whom he is well clear of. Returning home, Randy is met by Lib, his long-suffering fiancée. "I wish we were married," he tells her, and she points out that he makes the laws in Fort Repose; if he wants to grant himself a marriage license, he can. They are married on Easter Sunday, and Lib wears a white dress.

There is virtually no mention of fallout in *Alas, Babylon* except that Fort Repose is not affected by it. The prevailing winds on The Day carry any fallout out over the Atlantic Ocean, where it presumably disappears forever. Randy takes the precaution of tying his house's plumbing in to an artesian well on the property, yet the rivers and streams somehow remain

uncontaminated enough to catch and eat fish caught from them. Radiation sickness is reserved as a moralistic punishment for characters who lack the frontier virtues of the Bragg group. Porky Logan, Fort Repose's representative to the state legislature – who, coincidentally, defeated Randy for the office – loots jewelry from Miami on The Day. The ill-gotten baubles are almost white-hot with radioactivity. Randy and Dan locate some of this “poisoned” jewelry in Pistolville, the bad part of town, and trace it back to Porky. They find him dead of radiation poisoning in his bedroom, and bury him with his hoard. Randy also sees Rita again when he needs her small reserve of gasoline; as he leaves, she shows him her ring finger, now blackened by a radioactive diamond ring. “I’ve got a wedding band,” she says. “I was married to an H-bomb” (261). Her fate, like that of Porky Logan, is sealed by her failure to be morally upright in the face of disaster.

The idea that exposure to radioactive fallout was a fate reserved for the unprepared was, in fact, part of the larger American nuclear rhetoric. In the early 1960s *U.S. News & World Report* and *Life* magazine were still running cover stories with headlines such as “If Bombs Do Fall—What Happens to Your Investments” and “How You Can Survive Fallout” (Greenberg 2003). Although some measures, such as the famous “Duck and Cover” campaign, seem like risible pabulum in retrospect, interest in blast and fallout shelters was much more serious and sustained. In its September 15, 1961 issue, *Life* ran a cover that boldly declared “How You Can Survive Fallout: 97/100 can be saved: Detail plans for building shelters,” and published a letter from JFK endorsing the figures. Commercial firms marketed private shelters that ranged from a “\$13.50 foxhole shelter” to \$700 pre-fabricated models from Sears, and upwards to a \$5,000 “deluxe” model that included a phone, beds, toilets, and Geiger counters (Lutts 31). *Life* even ran

a story on a young newlywed couple who spent their honeymoon twelve feet underground in a steel-and-concrete shelter. “Fallout can be fun!” the article announced (Greenberg 2003).

Frank’s characters, however, have no use for fallout shelters of any kind.⁶⁵ Early in the novel, Mark Bragg assures Helen that he will be safe in “the Hole,” the massive underground shelter at Strategic Air Command in Nebraska, where he is “protected by fifty feet of concrete and steel and good earth” (65). His death is nevertheless presented as a foregone conclusion. Those who do survive the initial chaos and ensuing banditry are even healthier and more physically fit than in their former lives. Life after nuclear war particularly enhances the survivors’ masculinity. Lib’s father, Bill McGovern, is introduced as an overweight, washed-up retiree; by the novel’s conclusion he is “thinner, as they all were, and yet it seemed that he had dropped years as well as weight” (164). Randy is also “leaner and harder, and, truthfully, felt better than before The Day” (165). The next generation is equally unaffected by hardship and radiation; the first baby conceived after The Day is born perfectly healthy. Dan Gunn explains that while some genetic damage is inevitable, it is “only nature’s way of protecting the race”:

“Nature is proving Darwin’s law of natural selection. The defective bee, unable to cope with its environment, is rejected by nature before birth. I think this will be true of man. It is said that nature is cruel. I don’t think so. Nature is just, and even merciful. By natural selection, nature will attempt to undo what man has done.”
(194)

⁶⁵ This is perhaps another sign of Frank’s conservative politics. Louis Menand points out that “In the nineteen-fifties, the people who were enthusiastic about fallout shelters and evacuation drills, the now derided emblems of Cold War domestic culture, were liberals. All of the hundred million black-and-yellow fallout-shelter signs that appeared in the United States during the Cold War were put up by the Kennedy Administration” (3).

“Nature” is personified here as a transcendent force, employing the same model of recuperation at work in the Rocky Mountain Arsenal and Chernobyl “sanctuary” narratives. Disaster effectively reboots history, erasing flawed and short-sighted techno-cultural interference and allowing nature to “attempt to undo what man has done.” Nature becomes an essentially (politically) conservative force that reflects and is reflected by the survivalist values of Fort Repose.

Frank’s utopian Fort Repose is so effective that when outside help does finally arrive in the form of a military helicopter, no one in the town accepts evacuation; even the captain in the helicopter “kept mumbling that he was imposing” (311). Randy only asks “Who won the war?” as the helicopter prepares to leave, almost as an afterthought. “We won it,” the pilot replies immediately. “We really clobbered ‘em” (316). Frank’s depiction of nuclear war is thus deeply conflicted: the reader is simultaneously told that nuclear war is an unprecedented event for which adequate preparation is impossible, and that it is merely another war, survivable – and even winnable – with belt-tightening and the selfless heroism of strong men.

Ultimately, it is precisely this optimism that accounts for the astonishing popularity of *Alas, Babylon*. Its dogged hopefulness stands in stark contrast to other nuclear-apocalypse narratives of the day, which pointedly depict the horrors of the aftermath of nuclear war. Philip Wylie is almost ghoulish in *Tomorrow!* and *Triumph*’s stomach-churning descriptions of mangled and broken bodies. Neville Shute’s 1957 *On the Beach* is unsparing in its insistence that everyone in the world, without exception, will die after the bombs drop. Walter M. Miller’s *A Canticle for Leibowitz*, published the same year as *Alas, Babylon*, depicts nuclear war as a cyclical and inescapable madness. Even Merrill’s comparatively gentle *Shadow on the Hearth* treats domestic and physical trauma somberly. In contrast, *Alas, Babylon*’s unflagging optimism

makes room for traditional heroism, both in Randy as an individual and more generally in the idea of an infinitely adaptable and stoic American citizenry. The novel promises that even without fallout shelters, stockpiles of canned food, a functioning government, or even basic preparedness, the favored few who abide by an idealized version of traditional “American values” will survive and thrive.

Where Late the Sweet Birds Sang

A similar fantasy of immunity plays out in Kate Wilhelm’s 1976 novel *Where Late the Sweet Birds Sang*. After most of the world’s population is wiped out, a prescient extended family in the American Northeast survives by creating a self-sufficient and completely isolated society. The central character of Part One, a biology student named David, perfects a cloning technique that enables his family, the Sumners and the Wistons, to continue while the rest of the world is rendered sterile. Unlike the nuclear apocalypse narratives of the 1950s and 1960s, there is no single, dramatic event that marks the beginning of the end. While increasingly desperate nations ultimately do turn to nuclear war, the root causes of the crisis are legion. As the family patriarch, Grandfather Sumner, explains to David:

“The pollution’s catching up to us faster than anyone knows. There’s more radiation in the atmosphere than there’s been since Hiroshima – French tests, China’s tests. Leaks. God knows where all of it’s coming from. We reached zero population growth a couple of years ago, but, David, we were trying, and other nations are getting there too, and they aren’t trying. There’s famine in one-fourth of the world right now.” (Wilhelm 16)

All over the planet, fisheries are going extinct and massive climactic shifts are creating flooding, drought, and famine. The novel's implicit environmentalism largely takes the form of an idealized yeomanry; the family's farming makes them "Custodians of the soil, not its owners," as Grandfather Wiston says, "just custodians" (17). Their close ties to their valley give them not only self-sufficiency but insight into the coming crisis. They are able to see most clearly the threats posed by encroaching sterility and disease: "Every damn protein crop on earth has some sort of blight that gets worse and worse," Grandfather Sumner explains. "Corn blight. Wheat rust. Soybean blight. ... We're having shortages no one ever dreamed of" (17). He then adopts the broader worldview at which science fiction excels when he complains that the scientific and government elites "don't know what to do about any of it. ... The damn fools will lay each and every catastrophe at the foot of a local condition and turn their backs on the fact that this is global, until it's too late to do anything" (17). This witch's brew of causation – pollution, climate change, blight, and radiation – echoes the terrifying complexity of the toxic narrative as well as the formless dread so skillfully evoked by Rachel Carson in *Silent Spring*. Where no single source can be identified, let alone defended against or abated, the looming environmental threat becomes more menacing because it is a seemingly systemic collapse. In *Where Late the Sweet Birds Sang* there is nothing concrete against which the population can direct its anger. Instead, forward-thinking groups like the Sumners and Wistons turn inward, seeking safety in seclusion and self-sufficiency.

Beginning with the novel's early focus on fertility and agriculture, reproduction becomes the focus of Wilhelm's narrative. Sexual reproduction is the largest obstacle to the valley's long-term survival: widespread sterility and frequent miscarriages leave cloning as the only viable method to assure the survival of the valley's human. In preliminary testing, however, cloned

mice are infertile. Finally, David discovers that fertility gradually returns after the fourth cloned generation. Fertility here serves as a sign of the fundamental animality of human life: “Higher organisms must reproduce sexually or die out, and the ability to do so is there,” one doctor explains. “Something remembers and heals itself” (24). Every inhabitant of the valley submits his or her genetic material for cloning, and soon must face the strange prospect of growing old among a dozen or more copies of their younger selves.

This technological immunity to global sterility seems like a wholly benevolent application of science. The clones are perfect duplicates of their donors/parents, physically and intellectually sound in every respect. Yet Wilhelm quickly problematizes this technoscientific solution to societal collapse and infertility. It becomes clear to David, pondering a future of “uncles, fathers, grandfathers, all the same age,” that the creation of the clones was a mistake. “They’re inhuman, aren’t they?” he asks another donor. “They come and they go and we know nothing about them” (42). He sees his “aged and aging cousins rejuvenated, but rejuvenated with something missing. Familiar and alien, known and unknowable” (49). The uncanny, alien familiarity of these cloned generations proves increasingly unbearable for their ersatz parents, and several years into the project, one of the donors “strangled the small girl who looked more like her every day” (43). This murder, in retrospect, marks the final break between the dying family and their clones. W-1, one of the first generation of clones to reach adulthood, tells an increasingly worried David:

“Remember when one of your women killed one of us a long time ago, David? Hilda murdered the child of her likeness. We all shared that death, and we realized that each of you is alone. We’re not like you, David. I think you know it, but now you must accept it. And we won’t go back to what you are. Sexual

reproduction isn't the only answer. Just because the higher organisms evolved to it doesn't mean it's the best. Each time a species has died out, there has been another higher one to replace it." (52)

In response, David objects that cloning "stifles diversity," and W-1 counters that David is merely "assuming diversity is beneficial. Perhaps it isn't" (53). In the new communal social order of the clones, individuality is a threat to cohesion and bonding within and between groups of identical copies; this development represents a dramatic alternative to the heroic individualism of most apocalyptic survival stories.

Within a single generation the clones completely reject their ability to reproduce sexually, and come to fetishize sterility as purity. Their asexuality stands, in part, as a rejection of the masculinist aggression and paternalism that characterized *Alas, Babylon*. Fertility is further coded as a particularly female burden, with childbearing as a source of animalistic shame. Fertile women are pariahs valued only as stock from which to replenish the supply of clones, kept drugged and strictly isolated from their sterile sisters (their fertile brothers are presumably free to come and go as they please). Rather than depicting a technologically enabled freedom from childbearing as a feminist victory, Wilhelm romanticizes sexual fertility as the source of individuality and mental and artistic creativity. In a 1978 interview, Wilhelm states that in *Where Late the Sweet Birds Sang* she is "interested in the idea that the loss of individuality, the self, would destroy the urge toward artistic creativity" (Cadogan 13). Her critics have tended to focus on this homology of individuality and creativity. In his essay on the novel, Paul Kucera speculates that the clones embody "the desecration of creativity from sacred wonder to social technology. The clones' 'inhumanity' lies in the mechanical, sterile, and industrial means of their conception, gestation, and delivery"; they are "creatures" "in the sense of both created things and

monsters” (368). When Hilda strangles “the child of her likeness,” the novel acknowledges the monstrousness engendered on all sides by a system that answers sterility with a more extreme rejection of the creative principle.

As in *Alas, Babylon*, survival ultimately depends on self-sufficiency. The community’s continued existence is assured in the short term by physical isolation in the valley and technology (in this case, the cloning and non-uterine incubation which allow the original infertile valley survivors to reproduce), and in the long term by a more fundamental return to nature. The members of the clone society measure their success “by the degree to which they divorced themselves from nature and natural process,” seeking to remove uncertainty from their communal lives by eliminating sexual reproduction (Kucera 376). As new generations find themselves increasingly short of crucial supplies and lacking the ability to innovate new technologies or maintenance techniques, raiding expeditions must be sent out of the valley to scavenge for materials and machine parts from the ruins of American civilization. Although the atmosphere clears “as soon as man stopped adding his megatons of filth to the air,” these envoys to the outside world are still menaced by advancing glaciers, unpredictable weather, lingering lethal radiation around the ruins of major cities, and their own profound ignorance of what human society was like prior to cloning (Wilhelm 47). Only Mark, the naturally conceived son of two members of the first expedition out of the valley, is able to thrive in this uncontrolled and alien environment.

Mark and his mother Molly are the only members of the clone society capable of producing non-mimetic art. Although Molly and Mark’s father Ben are the most sympathetically presented clone characters, their creativity makes them misfits. Molly’s fertility also means that she is eventually imprisoned with the other “breeders” and disappears from the story after she

escapes into the wilderness. Mark's guardian Barry observes that "there was a little of Ben, and a little of Molly, and for the rest, [Mark] had gone into the distant past, dipped into the gene pool, had come up with strangers' genes, and he was unlike anyone else in the valley" (130). Without a cadre of identical brothers and sisters to socialize with, Mark retreats into the surrounding woods and spends his adolescence learning woodcraft rather than science. As the technology of the valley becomes more obviously unsustainable, Mark makes a final break from clone society, and the novel closes with an approving description of his "wild" woodland camp populated by fertile women, liberated from the breeding facility, and their children.

Although Wilhelm's conclusion bears superficial similarities to Pat Frank's in *Alas, Babylon* – a superior minority opt out of a flawed society to pursue a simpler, more "natural" post-technological way of life – it displays far more ambivalence than Frank's cheery "summer camp" mentality. Technology in *Where Late the Sweet Birds Sang* can offer a strange form of immunity to the toxic threats that have destroyed late twentieth-century civilization, but at the cost of creativity, individuality, and self-determination; for fertile women, the cost is even higher. The recovery of civilization is equally complex; the first "new" society of clones successfully replaces the previous generation, and does result in a more secure and harmonious way of life for the majority of its members. This society, however, is doomed by its own stagnation and over-reliance on technology, necessitating yet another recuperation based on yet another set of values.

Poison Ivy

The clones of *Where Late the Sweet Birds Sing* also represent another iteration of the idea of a superior post-human "successor race," familiar from works such as Wells's *The Food of the*

Gods and myriad scientific romances and pulps. Science fiction's fascination with toxic bodies as sites of both tragedy and super-human possibility is well-established, apparent even in early works such as "Rappaccini's Daughter" and *Seeds of Life*. In fact, one of the most common science fiction tropes is the "fortunate accident": the experiment gone awry, in which exposure to toxic chemicals and/or radiation results in the hero or heroine's acquisition of superhuman powers. For most of the twentieth century, comic books, rather than novels, sustain the genre's fascination with the fortunate toxic exposure. Golden and Silver Age comics feature characters such as DC's the Atom, the Elongated Man, the Flash, and Marvel's Man-Thing and Captain America, all beneficiaries of fateful doses of chemicals or radiation. Marvel Comics was particularly prolific in this vein during the 1960s and 1970s (largely thanks to writer-editor Stan Lee's enduring love of the trope), debuting characters including Black Panther, the Hulk, the Fantastic Four, High Evolutionary, Daredevil, and Spider-Man and his attendant suite of villains.

Present-day comic books have largely abandoned the perversely optimistic narrative of better living (or at least super-powered bodies) through toxic exposure. This shift is partially attributable to a decades-long trend toward "darker" superhero comics, but also reflects a growing public awareness of the actual effects of toxic exposures. For example, the superhero Dr. Manhattan in Alan Moore's *Watchmen* (1986-1987) faces media accusations that proximity to him has caused cancer in his closest associates; the claims turn out to be a hoax, but the possibility is enough to send Dr. Manhattan fleeing to self-imposed quarantine on Mars. Less dramatically, during the 1990s many titles revised their characters away from their toxic roots. Over the course of a serial narrative that spans decades, a given character can be continually re-written and re-imagined as cultural and publication contexts shift. This process, called ret-conning (short for "retroactive continuity"), allows for a central identity to be imbued with new

motivations, new relationships, new origins, or an entirely new world with which to engage.⁶⁶ In two recent ret-cons, Spider-Man's famous radioactive spider becomes a genetically engineered arachnid, and Swamp Thing is transformed from a toxin-doused botanist into a mystical nature elemental.

These types of fundamental changes to long-standing characters and storylines – many originally premised on toxic exposures – mean that comic books represent a unique opportunity to study the literary history of the toxic narrative. Perhaps the most prominent “toxic body” in contemporary popular culture is the *Batman* character Poison Ivy. As with any long-running comic book character, Poison Ivy's fictional identity is constantly in flux. She is what we might call a “referential character”; the reader knows her in a more complete way than any one comic book issue can depict. When she first appeared as a Batman adversary in *Batman* #181 (June 1966), she was merely a murderous seductress with a plant motif. Her backstory was fleshed out a decade later in *World's Finest Comics* #252 (August/September 1978); after surviving an attempted poisoning by her college botany professor and lover, Lillian Rose discovers she has acquired an immunity to all natural toxins. She renames herself Pamela Isley and takes on the larcenous Poison Ivy persona in order to fund her own botanical research. In subsequent issues, she develops plant-themed superpowers, including control over botanical life and a lethally toxic kiss. In the version of the DC Comics universe created after the 1985 “Crisis on Infinite Earths” storyline, Pamela Isley becomes a gifted biochemistry student whose mentor poisons her with plant toxins.⁶⁷ The resulting changes in her body chemistry leave her immune to all toxins, but

⁶⁶ There is at present no significant scholarly work on the practice and internal logic of the ret-con. The most frequently cited, Geoff Klock's *How to Read Superhero Comics and Why* (2002), is far more concerned with a Harold Bloom-style examination of the anxiety of influence than with the ret-con's positive and creative use of narrative play and re-invention.

⁶⁷ This character, Jason Woodrue, is later revealed to be the interdimensional plant-based supervillain Floronic Man. Able to control plant life through both technological and mystical means, he also appears as a villain in other

also half-insane and unable to conceive children. When her boyfriend dies from a mysteriously aggressive fungal infection, Isley drops out of school and eventually settles in Gotham City. There, she frequently is incarcerated in Arkham Asylum, where her sentence often includes total sequestration from the botanical world. This version of Poison Ivy is often depicted as more tragic than villainous, especially in the Neil Gaiman-helmed *Black Orchid* comics, in which she is cut off from all human contact by her toxic body chemistry.

Beginning in the early 1990s, Poison Ivy is portrayed as an eco-terrorist with a little mad scientist thrown in; she uses her affinity with plants to create new life forms, and directs her more dangerous powers only at those who threaten her, her allies, or patches of land that she considers to be under her protection. The exact extent of her virulence and powers shifts as much as her characterization. Through the years, she has developed the ability to control plants' size, shape and movement and, occasionally, level of sentience. In present-day continuity, Poison Ivy is physiologically part plant; her costume, once a leafy one-piece bathing suit, now usually consists of her own "leaves" arranged in titillating patterns. In all her incarnations, she is a seductress, controlling men both through her perfumes and poison kisses as well as an array of bio-chemical pheromones and "love potions." Her sexuality is predatory and fluid; she sometimes appears to be bisexual, falling in love with both Batman and Harley Quinn at various points. In one 2006 *Detective Comics* story line, she creates a huge carnivorous plant into which she feeds her "tiresome lovers."

This lethal sensuality is juxtaposed to strong elements of nurturing maternity, often centered on her inability to bear children. While incarcerated in Arkham, Ivy creates plant-based

botanical DC titles including *Black Orchid* and *Swamp Thing*. Marvel Comics has its own version of this character in *Spider-Man*'s Plantman.

artificial “children” as an outlet for her thwarted maternal urges. She also adopts Gotham’s Robinson Park (a stand-in for New York City’s Central Park) as a home for her creations. In one 2004 storyline, after Gotham City is devastated by an earthquake, Ivy lovingly shelters a group of human orphans in “her” park. Fearing that her toxic touch is killing the children, she turns to Batman, who engineers a way to change her metabolism back to that of a normal human. When Ivy later attempts to undo the cure, she dies. (True to comic book convention, she is resurrected in the next issue). She is simultaneously dangerous and nurturing, seductive and untouchable, close kin to both Elsie Venner and Beatrice Rappaccini; her susceptibility to toxic assault leads to invulnerability to toxins. Throughout her many reincarnations, her entire character is founded upon a toxic paradox: she embodies both the poisoned victim and the recuperation of the poisonous body.

In addition to her supporting appearances in the larger *Batman* universe, Poison Ivy has also featured in her own stand-alone volumes. I examine two of them: *Batman: Poison Ivy* (1997) and *Batman and Poison Ivy: Cast Shadows* (2004). In both, Ivy’s poisoned and poisonous body gives her the power not only to fight and exact revenge against her enemies but to heal and nurture her allies. The 1997 story opens with a fugitive Poison Ivy living in self-imposed exile on an island off the coast of Nicaragua. Using her power to create and alter plant life, she has turned the rocky outcropping into a miniature Eden populated by vegetable-based birds and animals of her own creation. Some of the mainlanders revere her as a fertility goddess. She tells one supplicant that she is most certainly not a goddess, but her dialogue appears in angle brackets; in comics, this customarily signals the speech of something non-human. Her appearance is also imposingly supernatural. She is drawn mostly nude, with strategically placed

flowering vines – *a la* Adam and Eve – growing around her legs and torso, and her red hair floats as if she is underwater.

Her Edenic idyll is shattered when the island – presumed to be uninhabited – is fire-bombed with an incendiary gel code-named “Prometheus.” Poison Ivy travels back to Gotham to exact her revenge on the Russian arms dealers who developed and financed the weapon, and their corporate front, the Gotham-based DeJardin perfume company. Her first victim is scientist Milo Frommer, the designer of Prometheus’s novel chemical structures. She seduces him at the Motel Flower, and then demands that he confess his sins. “You can’t possibly hold me responsible for the Russians’ mistakes,” he objects. “You’re always responsible for the things you create, Milo,” Ivy responds, and the scene ends as she slashes his rapturous face with a rose thorn (16). This Hawthornian rejection of an amoral model of science triggers a flash-back to her origin story, which reminds the reader that Ivy is herself a formally trained scientist.

Like “Rappaccini’s Daughter” or Carson’s “Fable for Tomorrow,” this story-within-a-story is framed as a fairy tale: “Once upon a time in the faraway city of Seattle there lived an innocent young girl named Pamela who only wanted to finish her thesis on plant and animal hybridization,” it begins. “No one told her that a monster named Woodrue would lure her into his laboratory with words of love – lies told so that he might transform the girl into another kind of monster” (23). Ivy’s fairy-tale monster merges with the same science fiction trope – the mad scientist – that Hawthorne invokes. Like Hawthorne’s Beatrice, her corruption at the hands of a masculinist scientist deprives her of physical contact and love. The next frame contains a visual allusion to the first casualty of her touch: her boyfriend pulling away from her embrace, as fungus pours from his open mouth. The silver lining to her new monstrosity is the “almost

supernatural control of the opposite sex” it grants her – Ivy’s powers, a combination of her body’s toxicity and pheromonal manipulation, operate exclusively on men.

This Ivy is also unambiguously in love with Batman, and her flashback features a frame of Ivy passionately kissing a sweat-drenched Batman as she looms over him in a clear position of power (24). Like Beatrice and Elsie, her craving for the love of a man leaves her weakened and vulnerable, while paradoxically highlighting her monstrosity. In the comic’s final lines, she confesses to Batman that “when the dark threatens to overwhelm me, I’ll remember how you took a bullet for me. You couldn’t do that if you didn’t love me.” “Ivy,” he replies, “you don’t know the meaning of the word” (46). Unlike her two literary progenitors, however, this rejection doesn’t kill; Ivy’s emotional vulnerability is a temporary lapse from which she recovers quickly, not the first step towards death. Her physical invulnerability, however, as well as her power, remain undiminished throughout.

Batman: Poison Ivy bookends its narrative with images and allusions which define the character of Poison Ivy in terms of her supernatural fertility and seductive allure. The final frame shows a single vivid bloom growing in what are presumably the burned ruins of Ivy’s island paradise, and a text box, shaped like a scrap of paper, containing a stanza by Tennyson:

*Come into the garden, Maud,
For the black bat, night, has flown.
Come into the garden, Maud,
I am here at the gate alone.*

The stanzas are labeled as being from “The May Queen” although they are actually lines from Tennyson’s poem *Maud*. However, this misattribution aligns this Poison Ivy with the 1990s Neil-Gaiman-era DC mythologizing of Swamp Thing, Solomon Grundy, and Black Orchid as nature elementals called Erl-Kings and May Queens.

This May Queen mythology largely had been written out by the 2004 publication of *Batman and Poison Ivy: Cast Shadows*. This Ivy, as written by Ann Nocenti, is mischievous, brutally intelligent, and definitely not a mystical fertility goddess. She is drawn by John van Fleet as approachably attractive; she has green lips and slightly green-tinged skin, but otherwise looks like the grad student next door, down to her thick-rimmed eyeglasses. The story opens with Ivy as an inmate in Arkham Asylum, clearly the sanest of the assortment of Batman villains incarcerated there. Building from the plant-animal “hybrids” she has created in earlier iterations, this Poison Ivy is now a twenty-first-century gene-splicer: “Cells are just... information,” she tells another inmate. “You can splice together the coding of different cells without any degradation of the genetic intent of each one. Encoded, decoded, recoded” (5). Setting up the comic’s central motif of light, Ivy has spliced together a phosphorescent fungus. Her creation is both a link to and a rejection of her femininity: “a hybrid created from mushrooms, molds, mildews, spiders and spores,” she says – “From smuts, dust and rust. No sugar, no spice, nothing remotely nice. Just what this happy homemaker found right here in her dank little dungeon” (4). Ivy’s burlesque of domesticity functions as a rejection of the ideal of femininity modeled in *Elsie Venner* and “Rappaccini’s Daughter,” which present a stark choice between power and loneliness or love and vulnerability, and extends Judith Merrill’s critique of the equation of domesticity with ignorance and helplessness.

This Ivy also has a certain ironic distance from her seductive powers, and a disdain for their effects. In this iteration, only her lips are toxic – no wafting pheromones or mind-controlling spores. She attends psychotherapy sessions in a face mask, ostensibly to protect her male psychiatrist from her kiss, which obscures her face and both literally and symbolically muzzles her. The doctor, winkingly named “Dr. Wood,” is pruriently invested in Ivy’s

femininity: “You’re a very *beautiful* girl, Ivy,” he condescends during one session in his private office. “There is no need to be so nasty. A bitter beauty is a bird without –” Ivy cuts him off: “Spare me the cornball poetry, Doc” (10). Rather than playing to her usual characterization as a seductress, this scene undercuts it at every turn. It is the overt sexual interest displayed by Wood – and by extension, perhaps, the gaze of the reader as well – rather than her sexuality itself, which is unsettling. Wood refuses to refer to Ivy “by that terrible name, *Poison* Ivy”; he objects not so much the name’s association with Ivy’s criminal career, but its reminder that his patient is not merely “a very *beautiful* girl,” a pliable and dependent female patient like any other. He sees her name as a repulsive boastfulness about the fact that “your lips secrete some kind of toxicity. Some *disgusting* fluid” (12, all italics original). Wood takes pains to frame Ivy’s “nastiness” and “*disgusting* fluids” as “a tragic medical condition that we are working to eliminate” (12). He is convinced, and wants Ivy to believe, that “the toxicity of your own lips is the root of your rage”; if he keeps Ivy on the proper cocktail of drugs, she “could lead a normal life. Get married, have children. A kiss will no longer mean *killing* the people you love” (12). In short, Ivy’s poison – her power – is incompatible with her proper role as a woman who “could lead a normal life.” Just as Ivy’s earlier comments about being a “happy homemaker” in her cell parody a retrograde model of femininity, Wood is engaging in his own retrograde fantasy of masculinity and scientific heroism. Ivy, however, recognizes Wood’s outlook as flawed and self-serving. “I’m *poison*! Ontologically, biologically, quintessentially, irreducibly *poison*,” she protests at the end of their session. “It’s not therapeutic to pretend otherwise – it’s *delusional*!” (45)

The action of the plot involves a series of mysterious deaths in which light pours from the eyes of “infected” victims, all male, who hallucinate, destroy the things they love, then slip into a coma and die. When the contagion turns out to be a toxic dust similar to pollen, Batman suspects

that Ivy is somehow behind the attacks. Although he is unable to prove his hunch, he still needs her “botanical genius” to determine the composition and origins of the toxin, and checks her out of the asylum. After a few requisite action sequences, the two determine that Doctor Wood is behind the murders; he has been poisoning the victims in a twisted attempt to woo Ivy by killing off the backers of a new skyscraper that blocks the light into her cell. Still, Batman’s assumption that Poison Ivy is somehow causing the entire affair is, to a degree, proved correct. Without consciously realizing it, Ivy has been using her pheromones and Wood’s attraction to her to manipulate him into fulfilling her desires for revenge and light.

At a crucial point during the investigation, Ivy’s lab work is interrupted by the news that the corpses of the infected are sprouting flowers. While Batman’s attention is diverted to the morgue, Ivy takes the opportunity to cure every patient in the hospital with a poison kiss. The idea that Ivy’s kiss is both poison and antidote is not unprecedented in the *Batman* continuity, but in this instance its significance is foregrounded. “It’s simply – opposites stimulate,” Ivy explains. “The poison inspires the antibodies. Sometimes a toxin, in a denatured form, is what instigates health” (30). In the final pages, Ivy refuses Batman’s order to cure the head of the light-blocking tower development: “He *built* this monstrosity!” she objects. “I cured everyone else – but this one dies” (49). As the tower collapses, pulled down by the weight of phosphorescent vines and flowers, Batman saves Ivy’s life. In return, after extracting a promise that he will no longer build high enough to cast shadows, Ivy grudgingly kisses and cures the developer. Batman returns her to prison; in the epilogue, an “anonymous benefactor” makes a large donation to Arkham Asylum, with the stipulation that Ivy be moved from her “dank little dungeon” and into a cell with a skylight.

The introduction of the idea of Ivy's poisonous kiss acting as an antidote destabilizes the neat dualisms which inspire older tales of poison maidens: poison and purity, power and passivity, beauty and monstrosity. Especially in the context of the literary tradition of the poison maiden, her character is unusual because her poisonous power gives her the ability to create as well as destroy. Poison Ivy represents a redemptive narrative of the toxic body as powerful rather than victimized, nurturing as well as predatory.

The Children of Men

The existence of hormone disrupting substances exploded into the public consciousness with the 1996 publication of *Our Stolen Future: Are We Threatening Our Fertility, Intelligence, and Survival? A Scientific Detective Story*, collaboratively written by Theo Colborn, Dianne Dumanoski, and John Peterson Myers.⁶⁸ Estrogenic chemicals mimic pre-existing bodily processes and hormones, binding to the hormone receptors of cells and altering or preventing normal function. A dizzying array of substances, from naturally occurring plant estrogens to plastics, can act as hormone disruptors. This constituted a new model for toxic exposure. In a chapter titled "Beyond Cancer," the authors of *Our Stolen Future* state:

If this book contains a single prescriptive message, it is this: we must move beyond the cancer paradigm. ... We need to bring new concepts to our consideration of toxic chemicals. The assumptions about toxicity and disease that have framed our thinking for the past three decades are

⁶⁸ *Our Stolen Future* was written for a popular audience; for a scholarly examination of the same issues, see Sheldon Krimsky's *Hormonal Chaos* (2002).

inappropriate and act as obstacles to understanding a different kind of damage. (203)

Moving “beyond the cancer paradigm” is far easier called for than achieved. Determining whether a given substance causes cancerous activity is comparatively straightforward: cellular growth either proceeds normally or abnormally after exposure. Studies on reproductive toxins, however, “involve effects on two parents, impacting a third developing human being. At work, at war, or even in one’s community, we often still know little about the multiple toxins to which people are exposed” (Daniels 147). Studies using human subjects are further confounded by the lack of suitable controls, ethical and cultural considerations, faulty memories and record keeping, and (in the United States, at least), a total ban on embryo research. The concept of an estrogen disruptor is, in contrast, appealingly elegant; the name also carried the added, media-ready suggestion of sex and subterfuge.

The threat of the estrogenic mimic also fit in neatly with the narrative surrounding a more specifically reproductive threat that emerged around the same time. In 1992 a team of Danish scientists led by Elisabeth Carlsen published a report in the *British Medical Journal* claiming to document a forty-percent drop in sperm count worldwide over the previous fifty years. The report also noted increased incidences of testicular cancer, cryptorchidism (undescended testicles), and hypospadias (a birth defect of the male urethra), but it was the sperm-count claim that touched off an international media blitz and scientific in-fighting. The ensuing scientific debate over the veracity of the Danish team’s findings is, in Nancy Langston’s wry understatement, “large and contentious” (“Gender Transformed” note 20).⁶⁹

⁶⁹ For a concise summary of the major arguments for and against the sperm-count drop, see Langston’s article.

The debate and ensuing media coverage directly inspired P.D. James, a British author primarily known for detective stories, to write *The Children of Men* (1992). Although the novel is set in a post-Chernobyl near-future, global male infertility is the result of a poorly understood mélange of environmental and chemical pollution, rather than nuclear fallout. The novel is told from the point of view of Oxford fellow Theo Faron, largely in the form of his diary entries. A scholar of Victorian-era history, Theo indulges in long digressions about the philosophical roots of “Omega,” the sudden global male sterility that begins in 1994 and becomes total in 1995, or “Year Omega.” The story begins on January 1, 2021, with the death of the youngest person in the world – a twenty-five-year-old South American man.

As in earlier toxic narratives, deformity is widely viewed as a worse fate than extinction. The final generation of humans, the Omegas, are startlingly beautiful, but as they reach puberty and are also found to be sterile, mandatory sperm testing is instituted for the population at large. Even relatively minor impairments exempt men from the mandatory fertility testing: the eventual father of a restored humanity avoided detection because he had mild epilepsy as a child. The authoritarian, vaguely fascistic government of post-Omega England decrees that “No one who was in any way physically deformed, or mentally or physically unhealthy, was on the list of women from whom the new race would be bred if ever a fertile male was discovered” (James 39). Julian, the first pregnant woman in decades, is not on the list of approved future mothers because she was born with a withered hand.

This revulsion regarding deformities, so strong that it results in the exclusion of rational responses to a reproductive crisis, reveals a cultural anxiety not just regarding male-specific reproductive problems or penile deformities, but around *feminization*. In the context of endocrine disruptor and sperm-count panics, “As men became ‘more like women,’ the dissolution of

boundaries between them produced disease and ‘weakness.’ It was this presumed feminization of men that had produced testicular cancer, lower sperm counts, and increased rates of ‘abnormal’ development in men” (Daniels 56). Popular media accounts of the “sperm-count crisis” placed blame on both “chemical castration” by environmental pollutants and a more general decline in masculinity; actual physical risks were conflated with threats to the norms of masculine behavior and identity. Responses in popular press and fiction included one or more of strategies of panic, denial, deflection, and reinstatement.⁷⁰

This larger cultural narrative is echoed in James’s novel. The male characters of *The Children of Men* have a petty, panicked quality, largely attributable to the first-person narration of Theodor Faron. Theo is a failure as a father (having accidentally killed his only daughter shortly before Omega) and as a protector. He is a historian listlessly keeping a diary to “record the nothingness” of the end of history, endlessly pondering his own physical decay and mental torpor.⁷¹ A more general male malaise is evident in his diary entries, which often obsess on the toll Omega has taken on men’s sex lives: “Like a lecherous stud suddenly stricken with impotence, we are humiliated at the very heart of our faith in ourselves,” he writes in one early passage. “For all our knowledge, we can no longer do what the animals do without thought” (James 6). Later, he complains that “Women, increasingly critical and intolerant of men throughout the 1980s and 1990s, have at last an overwhelming justification for the pent-up resentment of centuries. We who can no longer give them a child cannot even give them pleasure” (116). Even the characters with the most reason to consider themselves sexual success

⁷⁰ These strategies are still in play; as recently as July 2013, the animal rights group PETA issued a press release warning attendees of a New York festival that pregnant women who consumed chicken wings were risking penile deformities for their unborn sons (Perle and Rajt).

⁷¹ The character’s masculine bona fides are shored up to more palatable levels by the casting of ruggedly handsome action star Clive Owen in the 2006 Alfonso Cuarón film version. The film version also shifts the blame for humanity’s extinction away from a mysterious male impotence and onto an equally mysterious *female* infertility.

stories are riddled with shortcomings. Rolf, the leader of an underground anti-government activist group and ostensible father of Julian's child, is excited for his imminent fatherhood only as a new route to power and influence. He fails to appreciate, as Theo does, that his fertility would only mean life as a government guinea pig. He also does not realize that he has been cuckolded by the child's actual father, Luke; this fugitive Anglican minister is a soft-spoken, physically weak man who dies in the first violent confrontation of the novel.

With these deeply flawed masculine characters, James draws a concomitant failure of science. More than in any other work examined in this chapter, *Children of Men* communicates a deep and abiding anger toward a society that has maintained a willful blindness regarding the unseen consequences and side effects of its advances. In one diary entry, Theo writes:

We are outraged and demoralized less by the impending end of our species, less even by our inability to prevent it, than by our failure to discover the cause.

Western science and Western medicine haven't prepared us for the magnitude and humiliation of this ultimate failure. ... Western science has been our god. In the variety of its power it has preserved, comforted, healed, warmed, fed and entertained us and we have felt free to criticize and occasionally reject it as men have always rejected their gods, but in the knowledge that, despite our apostasy, this deity, our creature and our slave, would still provide for us; the anaesthetic for the pain, the spare heart, the new lung, the antibiotic, the moving wheels and the moving pictures. (5)

In *Liminal Lives*, Susan Squier draws a direct parallel between the male sterility scenarios in *Mr Adam* and *Children of Men*: she points to a passage in which Miriam, Julian's midwife, recounts a scene that almost exactly mimics Smith's discovery of the sterility in *Mr Adam*:

"I was doing a stint in the ante-natal clinic at the time. I remember booking a patient for her next appointment and suddenly noticing that the page seven months ahead was blank. Not a single name. Women usually booked in by the time they'd missed their second period, some as soon as they'd missed one. Not a single name. I thought, what's happening to the men in this city?" (James 148-49)

In *The Children of Men* "anxiety about fertility, and male fertility in particular, seems closer to the surface in 1993 than in 1946," Squier writes. "Female agency that in 1946 led women to stay away from hospitals is replaced by a male failure of agency in 1992," a trend that she describes as "a disturbing shift" towards narratives of failure, rather than intervention (54). Fears about falling sperm counts and physical and cultural "feminization" manifest in the toxic narrative as a loss of faith in masculine science, which has both caused the crisis and failed to predict or correct its mistakes. In the end, science cannot even protect its most devoted acolytes.

The novel situates hope for the future not in science, but in religion. If Omega is perceived as a punishment for the adoption of science as a golden calf, then the route to salvation must be through a return to "the old gods." Theo's initial account of Omega contains a repetition of the "superstitious awe" Aldiss describes in *Greybeard*: "The discovery in July 1994 that even the frozen sperm stored for experiment and artificial insemination had lost its potency was a peculiar horror casting over Omega the pall of superstitious awe, of witchcraft, of divine

intervention. The old gods reappeared, terrible in their power” (James 8). The “old gods,” not science, are responsible for the salvation of humanity; Julian flees to the woods rather than give birth in a sterile hospital, surrounded by masked obstetricians and “the acolytes, the gowned nurses and midwives, the anaesthetists, and beyond them, but dominant, the television cameras and their crews” (225). Fathered by a priest, the first infant in twenty-five years is born in a shed in the woods, attended by an outlaw midwife and a historian.

While post-Omega England’s initial turn to religion is apocalyptic (there are still flagellants in the public parks), subsequent years see a move “from the theology of sin and redemption to a less uncompromising doctrine: corporate social responsibility coupled with a sentimental humanism” (50). James rejects both extremes for the comfort of ritual and tradition. Luke is a priest of the now-underground high Anglican church. After he sacrifices his life to save Julian and his unborn child, Theo reads from the old Order of Worship for Luke’s hasty burial, including the Psalm that gives the book its title: “Lord, thou hast been our refuge: from one generation to another. Before the mountains were brought forth, or ever the earth and the world were made: thou art God from everlasting, and world without end. Thou turnest man to destruction: again thou sayest, Come again, ye children of men” (194). The novel ends on a note of religious awe as Theo christens the newborn baby, using his own tears and Julian’s blood to ritualistically paint the sign of the cross on the baby’s forehead.

The search for an escape route from the toxic narrative also draws on spiritual as well as technological or rhetorical aid. Especially when faced with the complexity of the relationship between environmental toxins and human health and reproduction, religious faith may offer as much comfort as rugged self-sufficiency or physical immunity. Religion might, at first, seem to play against the genre conventions of SF, which generally promote rationality over mysticism.

Martha Sammons has commented on SF's reputation as a staunchly secular literature, admitting that although contemporary science fiction "is often negative towards religion," SF is "an ideal form to deal with religious themes because it is, by nature, more interested in ideas such as the future of mankind or the ethical implications of science than many other genres. It is thus a natural type of literature to speculate about religion on other planets or in the future" (127). Sammons's argument is supported by the richness and complexity of SF texts that address religious themes.⁷² In Arthur C. Clarke's "The Star" (1955), for example, the Star of Bethlehem is revealed to be a supernova that destroyed the home planet of a vibrant, advanced civilization. James Blish's *A Case of Conscience* (1958) imagines a Jesuit biologist whose faith is tested by the discovery of an intelligent alien race who have achieved perfect harmony, yet have no concept of God. The relationship between religion and SF feels especially natural in the apocalyptic mode, where there is already a great deal of conceptual and linguistic overlap between fictional and Judeo-Christian eschatologies. Perhaps the most famous SF work in this vein is Walter M. Miller Jr.'s *A Canticle for Leibowitz* (1960), in which the Catholic monastic Order of Saint Leibowitz preserves the written record of civilization through two nuclear apocalypses.

These works are generally even-handed in their treatment of both scientific and religious worldviews; Slavoj Žižek has recently argued that in a society in which "science provides the security which was once guaranteed by religion," "in a curious inversion, religion is one of the possible places from which one can develop critical doubts about contemporary society (one of the 'sites of resistance,' as it were)" (446). One orthodoxy can be as troublesome as another – the

⁷² On religion in SF, see Frederick Kreuziger's *The Religion of Science Fiction* (1982), Paul Nahin's *Holy Sci-Fi!: Where Science Fiction and Religion Intersect* (2014) and *The Transcendent Adventure: Studies of Religion in Science Fiction/Fantasy*, edited by Robert Reilly (1985).

“black boxes” of technoscience can be as blinkering as religious dogmatism. In the context of the toxic narrative, where science has created powerful threats and faith in scientific solutions to those problems has not been rewarded, a turn to an opposing system is not irrational. Especially when toxins jeopardize the intimate landscapes of the body, rather than the commonly held landscapes of the environment, the heightened emotional and psychological stakes can make religion as a “site of resistance” especially appealing.

The varied narratives of power and immunity depicted in this chapter’s texts offer the possibility of redemption, renewal, or even revenge in response to toxic threats. Religious faith may transcend scientific and social blunders, “nature” promises a refuge from progress gone haywire, and toxins can even be re-situated as the catalyst for new superhuman bodies. These solutions may be partial or imperfect, but they represent an important counter-narrative to the depictions of loss, chaos, and disruption that are omnipresent in the toxic narrative in SF.

CHAPTER FIVE

“FRANKENFOODS” AND GENETIC TOXICITY

As my previous chapters have demonstrated, the creation of new life forms and the transformation of existing life has been a key component of the toxic narrative in science fiction from its earliest days. Early writers usually accomplished this transformation through chemical or surgical interventions (the latter most famously in H.G. Wells’s 1896 *The Island of Dr. Moreau*). In the later twentieth century, spurred by breakthroughs in DNA research, SF writers begin to produce stories centered specifically on genetic engineering. However, lacking specifics on how such experiments could be carried out, these stories tended to focus on end results rather than arcane processes. In the 1960s and 70s, cloning was most common genetic technology featured in SF, as seen in Pamela Sargent’s *Cloned Lives*, Ira Levin’s *The Boys From Brazil*, and Kate Wilhelm’s *Where Late the Sweet Birds Sang* (all published in 1976). This chapter links this genre tradition with current understandings and depictions of genetically modified organisms (GMOs), and particularly with GM agriculture.

The established conventions of the toxic narrative structure the contemporary literature and rhetoric surrounding genetic engineering, especially in anti-GMO discourses in which biotechnological interventions render living cells (and beings) “corrupted,” “contaminated,” and “polluted.” The science-fictional myth of *Frankenstein* has proven to be particularly potent where it cross-pollinates with modern genetic engineering technologies; these anti-GM discourses are a crucial part of the evolution of the larger toxic narrative. In addition to its critics’ rhetoric of contamination, escape, and pollution, GM technology and the organisms it produces are linked to the toxic narrative in two additional ways. First, the (apparently increasing)

“naturalization” of GM foods reflects the cultural and psychological mechanisms through which chemical and environmental toxins permeate our lives. The issue is effectively invisible even to the most environmentally conscious consumers; various lobbying bodies have so far successfully opposed laws requiring GM ingredients be listed on food product labels.⁷³ Like many of the other toxic narratives discussed in this dissertation, the texts examined in this chapter – Henry Adam Knight’s *The Fungus* (1985), Ruth Ozeki’s *All Over Creation* (2003), Paolo Bacigalupi’s *The Windup Girl* (2009), and Rob Ziegler’s *Seed* (2012) – all work to render this invisibility visible, to dramatize the otherwise mundane or seemingly inaccessible, and to reframe how we think about both hybridity and toxicity.⁷⁴

My inclusion of Ozeki’s traditional realist novel with three works of science fiction is intended to emphasize the ubiquity of GM agriculture; genetic modification is now the norm for millions, no longer necessarily insulated by the cognitive distancing of speculative near-futures. In these novels, the quotidian intimacies of food mesh with the larger toxic narrative’s exploration of the unseen chemical and genetic forces connecting the intimate and personal to the ecological and global. They can be productively read as an extension of toxic discourse; Lawrence Buell argues that “the iconographic power of toxic discourse” is shaped by media and literary interpretation and depictions (644). Thus, perhaps even to a greater extent than in other modes of toxic discourse, narratives devoted to GM foods often employ a kind of “moral melodrama” to persuade readers of both their social and ethical importance and their emotional legitimacy (L. Buell 650, Wallace 158). Importantly, however, rather than dwelling on dread and

⁷³ Nevertheless, some level of popular concern remains: “Otherwise,” Andrew Szasz notes, “why would Gerber refuse to use GM ingredients in its baby foods”? (140).

⁷⁴ The fact that almost all this chapter’s texts are all by American authors (with the exception of the British Henry Adam Knight and brief mentions of the work of Margaret Atwood, who is Canadian) is perhaps a symptom of “a negative form of American exceptionalism” that identifies the United States as the main origin of dangerous and/or unjust biotechnological practices (Carruth 6).

apocalypticism, this generic branch of the toxic narrative acknowledges the complexities and anxieties of encounters with “genetic pollution” and “Frankenfoods” without necessarily insisting on strategies of retreat, containment, or denial.

GMOs and GM Agriculture

In many ways, genetically modified food is nothing new; humans have manipulated plant and animal genomes for millennia, mainly through selective breeding and grafting. Proponents of GM technology frame it as just the most technologically sophisticated extension of the ways that humans have always modified plants and animals, and one that is actually more predictable and closely monitored than traditional trial-and-error Mendelian methods which have occasionally produced truly toxic crosses, like the dreaded tomato/potato. For GM skeptics, however, it is the *speed*, in addition to the *degree*, of the tinkering that gives rise to uneasiness. Although selective breeding can do harm (think of what humans have wrought upon purebred English bulldogs who can no longer give birth except by C-section, or ornamental goldfish effectively blinded by their bulging eyes), it is a slow process. Where it once took thousands of years to turn wolves into dogs, now “we can create novel organisms in years, months, even days” (Anthes 6). The technical language of genetic engineering can also be off-putting for a lay reader. Consider the “gene gun,” a method of transgenic introduction popular in the late 1990s, that shoots literal bullets (albeit .22-caliber plastic ones) that propel a mist of genetic material into a plant cell at 1400 feet per second. Viruses and bacteria, the current delivery methods of choice, are not exactly improvements in terms of popular perception. The very term “transgenic

organism” is hotly contested, both for reasons of scientific accuracy and because of the emphasis the term places on process (and thus the artificiality) of the organism.⁷⁵

Hostility toward GM technology, especially as it is practiced in agriculture, has historically been far lower in the United States than elsewhere in the world, but over the past decade or so various environmental and organic activist groups have “made opposition to it a pillar of a growing movement for healthier and ethical food choices” (Harmon A1). As Emily Anthes notes, debates over biotechnology rarely come down to science. In one Pew Trust study from 2003, “only 27 percent of Americans believe that the government should base its decisions about genetic engineering purely on science. Compare that with the 63 percent who think such decisions should take ‘moral and ethical factors’ into account” (Anthes 27). Popular opposition also appears to spring from what Harmon calls “the Monsanto Effect” – the corporate creation, ownership and sale of these novel organisms, which has been strongly associated with the “life sciences” giant. In fact, “Monsanto” has become a metonym for “a growing suspicion of a food system driven by corporate profits” (Harmon A1).⁷⁶ Perhaps a culture saturated by the mad-scientist tropes of science fiction is simply unable to take statements of scientific good intentions, and especially that of “ending world hunger,” at face value, sans scare quotes. This is, in the eyes of proponents of GM foods, unfortunate; as Seth Porges points out, the promise of agricultural genomics is “not just that it can create farmer-friendly products that are capable of

⁷⁵ A note on terminology is necessary here. Organisms that contain a foreign piece of DNA in their genomes are known as transgenic; the added genetic sequence is a transgene. A transgenic organism has a single gene from a foreign species present in every cell, while a chimeric organism has cells that come from two different species. Emily Anthes provides a helpful visualization: in a transgenic organism, every cell is blue with a single red dot of foreign DNA, while a chimera looks “like a patchwork quilt, with some cells that are entirely red, some entirely blue.” A hybrid – created when sperm from one species fertilizes egg from another – would be purple (Anthes 45).

⁷⁶ A prime example of this pessimism is Margaret Atwood’s novel *Oryx and Crake* – in this dystopia, biotech corporations and students of “NeoAgriculture” engineer grotesque hybrid creatures for human consumption or organ replacements. The novel is a vivid denunciation of genetic engineering for corporate profit; its two sequels, *The Year of the Flood* and *MaddAddam*, explore a post-technological world populated by childlike GM humans and a hippie commune of “God’s Gardeners.”

withstanding insects or long stretches on store shelves, but that it can help us squeeze more food out of limited soil space” as the world population continues to grow.⁷⁷

Better nutrition is also one of the laudable stated goals of GM agribusiness: nutrient-enhanced “Golden Rice” is the most famous example (although it is currently not grown for human consumption as a result of a variety of environmental concerns) and in 2010, the FDA approved a cholesterol-reducing soybean developed by DuPont Pioneer. The involvement of the FDA, rather than the Department of Agriculture, is telling. The U.S. government considers a new gene added to an organism to be a “drug,” and regulates organisms altered in this way under the Federal Food, Drug, and Cosmetic Act. Animals intended for consumption as food must undergo additional safety testing, but plants have clearly received special dispensation: while GM salmon and chickens are still languishing in labs, GM crops are now ubiquitous. According to the FDA, 93 percent of soy, 88 percent of corn, and 94 percent of cotton crops planted in 2012 were genetically modified (Porges).

While the specific concerns of the anti-GM movement are fairly recent, a more general “fear of food” has been growing for the past century. Even before Carson’s indictment of the overuse of pesticides and herbicides in *Silent Spring*, rumblings of fear were building. As far back as 1933, Arthur Kallet and Frederick Schlink published the best-seller *100,000,000 Guinea Pigs: Dangers in Everyday Foods, Drugs and Cosmetics* (its original title was *Poisons for Profit*). This sparked a wave of so-called “guinea pig journalism” and is often cited as being one of the key catalysts for increased government regulation of food and drugs and the passage of the 1938 Federal Food, Drug, and Cosmetic Act (Levenstein 76).⁷⁸ These concerns were largely

⁷⁷ The United Nations expects the world population to tip past the 9 billion mark around the year 2050.

⁷⁸ Also see J. Whorton’s *Before Silent Spring* (1974).

superseded by the technophilic optimism of the 1950s, an era in which the media celebrated, rather than criticized or feared, technological interventions in growing and processing foods. In 1950, when a Congressional committee revealed that food processors had introduced approximately 850 new chemical additives into the American food supply since 1938, producers themselves began issuing proud lists of their “new chemicals,” all approved by the FDA as “Generally Recognized as Safe” (Levenstein 110-111). In 1958, the National Cancer Institute released a study demonstrating that a number of FDA-approved food additives caused cancer in rats; in 1959, weeks before Thanksgiving, the Secretary of Health issued a warning that a carcinogenic weed killer had found its way into Washington and Oregon cranberries. By 1969, sixty percent of Americans in one survey thought that even carefully used agricultural chemicals posed serious health dangers, and subscriptions to *Organic Gardening and Farming* jumped forty percent (to 700,000) between 1970 and 1971 (Levenstein 117).

The feeling that food is a source of danger as well as nourishment helps contextualize the anxieties swirling around GMOs, and makes a study of GM food plants an incredibly productive site of inquiry. Surprisingly, it is also an area that has been comparatively neglected in contemporary science and cultural studies. Even though the vast majority of the work in gene transfer is taking place in greenhouses and the most widespread commercial application of genomics involves plants, designer babies and GloFish[®] get the headlines and journal articles. And while, as Molly Wallace points out, “literary and cultural critics have produced a fairly substantial archive of responses to genetics in general and genetic engineering more specifically,” the bulk of this work focuses on GM animals, not plants or food (156). One of the few scholarly essays on the subject is Susan McHugh’s 2008 “Flora, not Fauna: GM Culture and Agriculture.” In this essay, McHugh interrogates film and fiction’s almost exclusive focus on

GM humans and animals, “a trend that suggests a broader representational problem: why do animals (and not plants) loom large in the public imaginary while plants (and not animals) have become the medium of daily encounters with transgenic organisms?” (25). She urges us to turn away “from the spectacular fantasies of resurrected dinosaurs and cloned dogs” – the charismatic megafauna of transgenics – “toward stories of more mundane interactions” (27). Contrasted to stories of murderous mutants and viral plagues, plants may seem dull, but their existence and deployment in our lived experience can provide an immediacy to a consideration of the ways that GM technology “currently affect(s) human and other lives and, what is more, to how we can begin to get a handle on these developments” (47).

McHugh’s argument points the way to the central concern of this chapter: that GM crops represent an excellent practical example of the boundary-breaching toxic narrative in SF. They are an almost perfect composite of nature and culture: they are clearly an artefact of technoscience, and yet are just as clearly living, metabolizing organisms, literally rooted in the natural world. Unlike Haraway’s OncoMouseTM or glow-in-the-dark kittens, drought-resistant soybeans do not, as it were, wear their artificiality on their sleeves. They and their field-mates enter the food supply invisibly, an analogue to the mundane and often untraceable routes along which pesticides and fertilizers enter our hair and blood and bones.

GM Plants in Science Fiction

Over the past decade, agriculture and food studies have emerged as interdisciplinary fields that work to link cultural and environmental questions about the food system to the ways

in which literature can document and interrogate that system.⁷⁹ However, literary scholars have generally analyzed both agriculture and food “in terms of the symbolic meanings they convey about other cultural issues, such as class and gender” (Carruth 165). I argue, as does Allison Carruth, that “food functions in imaginative works of the twentieth and early twenty-first centuries not just as symbol but also as rhetoric and praxis” (166). We must attend to the role of plants – and the organized systems of gardening and farming that accompany them – as substantive parts of an intricate interplay among the cultural, the technological, and the non-human, interesting and important in themselves. The emergence and growing ubiquity of genetically modified plants makes these complex relationships more discernible and more dramatic.

The reality of fields and grocery store shelves filled with GM food crops is a recent development. Science fiction, however, has been concerned about the potential for collapsed nature/culture boundaries brought about by genetic tampering long before the contemporary agribusiness technologies which are the center of current debates. Even at their most invisibly and passively, GM plants are in many ways iterations of what philosopher Bernard Rollin refers to as “the Frankenstein thing”: an uncanny product of science that gives form to a nebulous suspicion that “there are certain things humans were not meant to do”(vii). Genetic engineering often appears at the top of that list; in fact, “Frankenfood” is one of the most common epithets lobbed by anti-GM activists. Monstrous plants are, of course, less common in science fiction than monstrous creatures or people, but when they do appear they are often cast in the same science-

⁷⁹ See, for example, FitzSimmons and Goodman’s “Incorporating Nature: Environmental narratives and the reproduction of food” (1998), Goodman and Watts’ edited collection *Globalising Food* (1997), and Susan Squier’s “Agricultural Studies” in *The Routledge Companion to Literature and Science* (2011).

fictional “othering” roles as aliens and movie-monster animals. My earlier chapters have examined several examples in this vein (most notably the Grass of *Greener Than You Think*).

In other “monster-plant” stories, the plant villains are literally alien. H.G. Well’s *The War of the Worlds*, for example, features a noxious Martian weed that creates almost as much confusion and destruction as the Martians themselves. Perhaps the most famous monster-plants are the triffids of John Wyndham’s *Day of the Triffids* (1951). These murderous plants are able to overrun the British Isles by “walking” on their roots, using their deadly whip-like poisonous tentacles to kill their human victims and feed on their rotting carcasses. The novel’s biologist hero develops a theory that triffids were bioengineered in the USSR and then accidentally released from a crashed Soviet airplane, while other characters suggest that they were seeded from some other planet.⁸⁰ This debate is never fully resolved. In a break from genre convention, Wyndham’s novel ends with a small band of human survivors abandoning England to the seemingly invincible triffids, taking their last stand in a self-sufficient farming community on the Isle of Wight. The chapter is titled “Strategic Withdrawal,” but it seems unlikely that humanity will ever truly rally to defeat the murderous plants. Wyndham’s triffids have proved enduringly popular: an estimated 6.1 million people tuned in for the first episode of a 2009 BBC miniseries adaptation (*TV News*). Their mass appeal suggests a draw far beyond simple sci-fi camp: although their behavior is admittedly more animalistic than vegetal, the triffids are not fought down and contained in the way that is so typical of the mutant/monster narrative. Their victory suggests a role for GM plants very different from the containment and control central to mutant animal narratives.

⁸⁰ Wyndham himself frequently acknowledged the influence of Wells’ *The War of the Worlds* on *The Day of the Triffids* (see Edmund Morris’s introduction to the 2003 Modern Library edition of the novel).

The Fungus

Although *The Fungus* (1985) largely depicts its GM plants *as plants*, it is still firmly situated in the older monster stories of the tradition. Its author, Henry Adam Knight⁸¹, is best known as for pulpy horror and gore novels like *Carnosaur* (1984). *The Fungus* is alarmist and reactionary, reminiscent of some of the most exploitative stories of the pulp era (it was, in fact, retitled *Death Spore* for a 1990 re-issue). The novel is interesting, however, in that was written precisely on the cusp of a revolution in GM technologies. The first transgenic plant, an antibiotic-resistant tobacco plant, was created in 1983, and the early 1990s would see a raft of GM plants brought to market after Calgene's commercial release of the FlavrSavr tomato in 1994.⁸² While *The Fungus* traffics more in shock value than scientific accuracy, its depiction of its monster plants as specifically transgenic makes it a notably transitional moment in the development of a concept of genetic toxicity.

The novel is obsessed not only with monstrous growth – specifically, of fungi⁸³ – but with the perfidy of female scientists and women more generally. The links between monstrous growth and “normal” human fertility are rarely so clearly, or negatively, drawn as they appear in *The Fungus*. Jane Wilson, a botanist and endocrinologist, hopes to end world hunger with a new species of fast-growing mushrooms. Working with a small team of assistants, she first succeeds in creating a mushroom genetically engineered to be rich in proteins, but “these traits obviously

⁸¹ Henry Adam Knight is a pseudonym used predominantly by John Brosnan, often in conjunction with Roy Kettle; it is unclear exactly how much of the writing of *The Fungus* to attribute to each man.

⁸² For a concise history of this period, see James and Krattiger's “Global Review of the Field Testing and Commercialization of Transgenic Plants” (1996).

⁸³ There is, in fact, a rather odd sub-subgenre of science fiction devoted to horrific fungi; writers of “weird fiction” such as H.P. Lovecraft and William Hope Hodgson seem to be especially drawn to the uncanny fleshiness and nocturnal growth of mushrooms and their kin. The fascination is alive and well in novels of the “New Weird” school: the plot of Jeff Vandermeer's 2014 *Annihilation*, for example, centers on a mysterious (and possibly murderous) underground organism that writes doomsday prophecies using the “fruiting bodies” of a strange fungus.

inhibited the mushroom's reproductive cycle" (Knight 27). From this failure, she isolates an enzyme that acts "like a super-catalyst" to speed the growth of all fungi, an invention reminiscent of Wells's *Herakleophorbia* and Moore's *Metamorphizer* (28). As in those earlier novels, the story becomes a cautionary tale of failed safety precautions, as the indirect effects of the enzyme (itself not directly dangerous to humans) swiftly prove catastrophic. It not only "has the power to alter the genetic programming of every fungus spore it comes in contact with," but is "spreading from one species to another at an alarming rate" (82). London and then the rest of the British Isles are quickly overrun by monstrous mushrooms, molds, and yeasts.

The speed of the enzyme's spread is remarkable. For the most part, narratives of monstrous growth have emphasized the fear of the unseen early stages; in *The Fungus*, the changes occur literally overnight. "It seemed incredible," the protagonist, Barry, observes at one point, "that London had been transformed into some kind of nightmare world in such a short space of time" (70). This may partly be attributable to market forces in the genre; the "contagion novel," which was becoming popular in the 1980s, trades on a similar inescapably swift diffusion. In *The Fungus*, this speed is attributed to the dual nature of the threat: both the enzyme and the monstrous fungi it engenders are capable of endlessly reproducing themselves, and each new generation needs to be isolated and eradicated.

This search-and-destroy mission displays an unshaken faith in militarism and a masculinist science placed in clear counterpoint to the feminized genetic tampering represented by Jane Wilson. Barry, Jane's estranged husband and a failed scientist turned detective-story writer, is called in by the British military to track down her lab notes, which have been lost somewhere in darkest fungal London. The chemical that causes the chaos is repeatedly referred to as "Jane Wilson's enzyme," a clear assigning of blame. The two female scientists in the novel

are both disastrous failures, personally and professionally: Jane is the cause of the disaster as well as a neglectful wife and mother, and the other, an ace botanist sent along on Barry's mission, is quickly reduced to a hysterical sex object who at one point is sexually violated by a fungal growth.

In a sort of gender-flipped Frankenstein story, *The Fungus* performs a dark reinterpretation of scientific discovery as "creation." The novel codes any science not performed by men as a form of monstrous motherhood; Jane Wilson's maternal instincts are displaced away from their natural beneficiaries – her son and her husband – and onto her lab work. Rather than being de-feminized by science, her female-ness makes her science perverse. When her experiments with giant fungi succeed, the narrator mockingly employs the clichés of wedding announcements, declaring the moment "the happiest day of Jane Wilson's life" (26). She sees herself "cradling the organism in her arms" in a way that she recognizes as being "like the Madonna and Child" (26). She then realizes that "she couldn't remember ever feeling this elated before, even at the birth of her son Simon" (26). Even her goal of ending world hunger is the result of a highly suspect urge to subsume herself, and the rest of humankind, within with a feminized nature rather than to subjugate it: "We will become one with nature instead of fighting against her," she writes in her notes. "There will be no more hunger or pain. We will be enfolded and nourished by her forever" (207). In the novel's climax, Jane is revealed as an irredeemably monstrous mother who destroys the son of her body, who is naturally immune to fungal infection, in her mad quest to protect the fungi, the favored children of her lab.

Throughout the novel, even uninfected bodies are presented as grotesque. The fungi generally treat human bodies as merely another source of nutrients; while many people are straightforwardly devoured, others become gruesome, mindless hosts for parasitic growths. This

second fate often presents as outright misogyny: the novel exhibits a fascination with sex as a vector for monstrosity, and especially with the idea that women are inherently infected or compromised, or somehow “naturally” prone to host such monstrosity. In Chapter Two, lesbians Barbara and Shirley are devoured from the inside out by a yeast infection. Other characters are infected after having sex during a camping trip; they and their children are swiftly reduced to mindless, cow-like creatures, crawling on all fours and eating grass.

In the end, Barry manages to locate Jane’s lab and fights his way through her fungus-symbiont minions. Confronted by his wife and the dying body of his son, Barry smashes her head open with a piece of her own lab equipment. In death, Jane is exposed as a husk, human only in the barest external sense, filled with green fluid and wriggling hyphae. Just as she wrote in her notes, she has “become one with nature instead of fighting against her,” and has been consumed entirely; it is as though her monstrous insides were manifesting the corruption to which she has been prone since the opening of the novel. After crossing that boundary, no shred of humanity remains to her – Barry comforts himself that killing her isn’t actually murder because she willingly ceased to be human when she embraced a monstrous, feminized nature. The novel ends with Barry drunkenly celebrating on the roof of Jane’s ruined lab; having dispatched the evil queen, “he knew for certain that the battle would be won and the fungus would be destroyed” (218). His certainty is strange, considering that he has no way to deliver Jane’s notes to the proper authorities, or even to escape London without succumbing to his own fungal colony. It seems, then, that the true source of disorder is not “Jane Wilson’s enzyme,” but Jane Wilson herself. With her death, the “natural” order of rational/masculine domination of the green world will somehow inevitably re-assert itself. The straightforward bravado of the conclusion is in line with the pulps and B-movies Knight was best known for; however, its

positioning of transgenic plants as quasi-sentient, rampaging freaks would quickly become less tenable as GM technology moved out of the realm of science fiction and into late twentieth and early twenty-first century agriculture.

All Over Creation

As GM plants became less fantastic and more mundane, depictions of both biotechnology and its creations begin to appear in mainstream novels. These depictions, however, are often still framed in the science fictional rhetoric of apocalyptic visions and the Frankenstein myth. Ruth Ozeki's first novel, *My Year of Meats* (1998) often strayed into didacticism in making its denouncement of the beef industry. Her second novel, *All Over Creation* (2003), is more immersive even while being – a review in the *New York Times* puts it – “another novel about the foul nature of what we put in our bodies” (Dederer). The sprawling cast of characters includes salt-of-the-earth potato farmers in Idaho, vegetarian activists crisscrossing the country in a biodiesel RV, and agri-business CEOs in *feng shui*-ed office suites. They are drawn together by the “NuLife” potato, a thinly fictionalized stand-in for Monsanto's genetically engineered “NewLeaf™.”⁸⁴ The novel sets the dark comedy of resistance to corporatized “Nature” against a realist depiction of domestic life threatened by the biopolitical and economic conflicts that have come to define contemporary farming in the United States. In this regard, the novel envisions Bill McKibben's “end of nature” with a strangely bittersweet optimism, linking decisions about planting GM potatoes to larger narratives of bodily and cultural fertility.

⁸⁴ See Susan McHugh's article for more on the real NewLeaf™ campaign.

Lloyd Fuller, the tallest man in Liberty Falls, Idaho, and his Japanese wife Momoko were once the owners of the largest potato farm in Power County. After their daughter Yumi (nicknamed Yummy), has an abortion and runs away at fourteen, their lives fall apart. Cassie and Will Quinn now farm the acreage while the elderly Fullers devote themselves to cultivating and disseminating Momoko's collection of rare and heirloom vegetables, flowers, and fruits. The Cynaco corporation – a fictional stand-in for Monsanto – begins marketing its “NuLife” to growers like the Quinns, promising a reduction in the amount of pesticides they need to spray. Ozeki makes explicit links between human and plant life: the garden saves Lloyd and Momoko's marriage after Yummy's departure, while young Cass Quinn's annual relegation to the role of potato in her school's Thanksgiving pageant foreshadows her self-image as “a fat, round, dumpy white thing,” worn down by too many years as “a side dish” (Ozeki 7).

Cass's body is linked to potatoes in more than a metaphorical sense. She increasingly suspects that her infertility and breast cancer are the result of the inputs she and Will pump into their soil:

“At first we thought nitrates in the groundwater, so we got the well tested and got filters and everything, but it didn't help. Then we thought it might be one of the other inputs – stuff we use around the farm. For a while Will even thought it might be some kind of chemical exposure from overseas. ... He fought in Vietnam,” she said. “And it could be any of these things, or none of them, or maybe even some combination. It's just impossible to know for sure. And even if we could prove it was something we were using, what could we do?” (77)

In Cass's case, GM potatoes offer a new chance at the pregnancy she so desperately wants. Will Quinn reads NuLife marketing materials promising that the "enhanced" potatoes will allow them to cut back on the chemicals typically required to produce a marketable harvest. Even though he remains skeptical, he signs on to "try a few acres. See what happens" (220).⁸⁵ The symbolic association of potatoes and children is reinforced by the seed company logo on Will's cap: a "little diapered spud" and the slogan "We handle 'em like babies" (99).

The reproduction of the potatoes themselves receives an equally empathetic treatment. Potatoes are cultivated using a pre-technological form of cloning; plantings consist of buds carved from the mature tubers, each one a genetically identical offspring of the parent plant. Lloyd Fuller feels a kind of religious awe for this process: "In a very real sense a potato plant is immortal," he thinks. "There is something divine in this potency, but it needs care and protection" (112). To Lloyd, the fertility of plants is a sacred trust given to man by God. He writes a monthly newsletter for the customers of Fuller's Seeds, repeatedly expressing his disapproval of "Agribusiness and Chemical Corporations" that seek to patent, restrict, or otherwise control this sanctified process for profit. His criticism is couched in Biblical language:

Some say that is entirely appropriate for us to engage in Genetic Engineering. God made Man in **His Own Image**, after all, so it is only natural that we should strive to emulate Him.

Having eaten from the Tree of Knowledge, we should know the difference between good and evil, but we do not. **We are not gods**. Scientists do not understand Life Itself, and when they meddle in its Creation, they trespass on

⁸⁵ The actual NewLeafs were not widely adopted because of their prohibitive cost, which is apparently not an issue with the fictional NuLifes.

God's domain. Beware of the ungodly chimera they manufacture in their laboratories!

It is our nature and our sorrow to confuse Man's mortal hubris with **God's Divine Will**. Mrs. Fuller and I hope that there are enough of you out there who share our views, and who will choose to cultivate wisely this Garden that we were given, rather than to turn it into a wasteland. (105, emphasis original)

Lloyd's anti-GM proselytization catches the eye of "The Seeds of Resistance," a group of vegetarian activists headquartered in a bio-fueled Winnebago (the "Spudnik") who stage theatrical pro-organic "actions" at supermarkets. Here, Ozeki dramatizes the surprising resonances between evangelical Christianity and environmentalist rhetoric: for both nonconformists hippies and Bible-quoting fundamentalists, the manufacture and commodification of life itself is unconscionable.

The newest Seed is Frank Purdue (no relation, he must constantly point out, to Purdue Poultry), a teenaged McDonald's janitor. He joins the Seeds because he is tired of living in Nebraska and they have good weed; the specifics of the outrage that motivates the rest of the Seeds, however, elude him. Geek, one of the lead Seeds, tries to explain what the group agitates against:

"Biotechnology. Robocrops. Frankenfoods. Fish genes spliced into tomatoes. Bacterial DNA into potatoes. Corn and –"

"Cool! You do all that stuff right in here?"

"No, Frank," Geek said. "We're against that."

“Oh.” Frankie was disappointed. (53)

In the Seeds’ philosophy, humans and vegetables are symbionts: people eat the plants, and by propagating and caring for their seeds, “we service their DNA,” as Geek explains. “We depend on plants. They depend on us. It’s called mutualism. The balance between nature and culture. At least, it used to be. But now the balances are shifting” (124). Cross-species breeding is “the line that nature drew in her soil, which we simply weren’t allowed to cross,” and now GM technology has shattered the status quo irretrievably. Unbeknownst to him, Lloyd has become the Seeds’ spiritual leader: “He’s an icon!” one enthuses. “Total salt of the earth. The American farmer making a lonely stand, defending his seed against the hubris and rapacious greed of the new multinational life-sciences cartel” (106). The Seeds fire up the Spudnik and make a pilgrimage to Liberty Falls and the Fuller’s greenhouse.

Lloyd and Momoko’s estranged daughter Yummy also returns home from her new life in Hawaii after Cass Quinn reveals that Lloyd’s heart is failing and Momoko is increasingly incapacitated by Alzheimers. She brings with her her three children, fathered by three different men of three different races. Her promiscuousness and the racial diversity of her children comes as a shock to white, rural Power County.⁸⁶ Despite her name’s pleasant connotations of consumption and reproduction, Yummy is no earth mother. She avoids contact with her parents even when they are hospitalized and dumps her children with Cass for long periods of time to

⁸⁶ Several critics have read the racially diverse Fullers as a metaphorically rich interrogation of both plant and human “purity,” placing Yummy’s fecklessness in tension with an otherwise straightforward embrace of multiculturalism and diversity. Ursula Heise in particular has noted Lloyd’s support of exotic plants even though “invasive species” have devastated native plant life in the Americas; she concludes that we “need to be wary of falling back into the problematic habit of deriving socio-cultural ethics and political stances from the insights of ecological science” (Heise *American Literary History* 401). Spencer Schaffner, in a response to Heise’s reading, points out that this “problematic habit” has a long history in America and actually supports a more progressive interpretation of Ozeki’s novel.

carry on an affair with Elliot Rhodes, the amoral former teacher who impregnated and abandoned her when she was fourteen.

Rhodes now works for the public relations firm that represents Cynaco. His last assignment was spin doctoring for a tobacco company – “truly on the side of evil,” as one character puts it – explicitly linking the moral bankruptcy of Big Tobacco to Big Seed (179). His boss ships him back to Liberty Falls to ferret out incriminating facts about the Seeds of Resistance. The firm hopes to use this information to launch a smear campaign against the activists as a counter to a recent cover story in *The New York Times Magazine*. The cover image is a potato with Frankenstein-monster neck bolts jammed into its sides; the humorously monstrous cover starkly contrasts the humorously sexualized spread inside. There, “sprawling over two pages like a Playboy centerfold, was a long, plump, beautifully reticulated potato” (85). Elliot scans the article, noting that the author “talked toxins. He named names. The contents of the article looked bad enough, Elliot realized, but the title was genius. Printed across the tanned, genetically engineered skin of the centerfold tuber, in a pastel font, were the words ‘Playing God in the Garden’” (85).

“Playing God in the Garden” is, in fact, a real article published by celebrity food writer and gardener Michael Pollan in the October 25, 1998 issue of *The New York Times Magazine*. The essay documents Pollan’s experience planting the actual Monsanto NewLeaf™ in his garden. The NewLeaf is a “Bt” potato. The addition of DNA from the *Bacillus thuringiensis* (Bt) bacterium effectively enables the plant to produce its own pesticide; several varieties of Bt potatoes, corn, cotton, and soy are all currently grown in the U.S. Even before he puts the NewLeafs in the ground, Pollan is taken aback by the small print in his Monsanto-issued “Growers Guide.” He is only “licensed” to grow a single crop of the spuds; propagating the eyes

from his crop would be a violation of “numerous United States patents, including Nos. 5,196,525, 5,164,316, 5,322,938 and 5,352,605” (Pollan). What’s more, “the Growers Guide also brought the news that my potato plants were themselves a pesticide, registered with the Environmental Protection Agency” (ibid).⁸⁷ Knowing this, he writes that “I couldn’t help thinking of them as existentially different from the rest of my plants”:

All domesticated plants are in some sense artificial — living archives of both cultural and natural information that we in some sense “design.” A given type of potato reflects the values we’ve bred into it — one that has been selected to yield long, handsome french fries or unblemished round potato chips.

My NewLeafs are different. Although Monsanto likes to depict biotechnology as just another in an ancient line of human modifications of nature going back to fermentation, in fact genetic engineering overthrows the old rules governing the relationship of nature and culture in a plant. The introduction into a plant of genes transported not only across species but whole phyla means that the wall of that plant’s essential identity — its irreducible wildness, you might say — has been breached. (ibid)

Without necessarily putting his argument in terms of the toxic narrative, Pollan anticipates my larger argument about GM plants: they represent the same nature/culture porosity as toxins; in the case of NewLeafs, they are even legally categorized as a pesticide. In spite of his rhetoric of overthrows and breaches, the loss of “irreducible wildness,” Pollan forms an ambivalent

⁸⁷ Indeed, Bt crops like NewLeaf potatoes can be read as an ironic extension of the final chapter of *Silent Spring*, in which Carson recommends biological rather than chemical pest control. She even mentions Bt as an alternative to DDT. At present, Bt spray is allowed in organic farming, although organic farmers warn that incorporating this gene into plants may accelerate insect resistance (Wallace, Note 8).

relationship with “his” NewLeafs: “while my biotech plants might seem like alien beings, that’s not quite right,” he concludes. “They’re more like us than like other plants because there’s more of us in them.” They represent a new technological means, in one respect, of enhancing the human “stewardship” of a natural world that has been a defining characteristic of civilizations since the advent of agriculture and animal husbandry

It’s not merely the bacterial toxins produced inside of the NewLeaf that give rise to anxieties about growing and eating them. After all, as Pollan points out, Bt is the same “all-natural” insecticide that organic growers have relied on for decades (although in the end, he still can’t bring himself to serve the spuds to his friends and family). As in the larger debate over GMOs, the organisms themselves are less threatening than the presumptive motives of the corporations that create them. As Timothy Morton has puts it in *The Ecological Thought*, “What’s wrong about genetic engineering is that it turns life into private property to enrich huge corporations” (86). Plants and seeds, which reproduce themselves almost infinitely, would not seem to easily fit into the systems of large-scale commodification: indeed, Pollan writes, it is “for that reason the genetics of most major crop plants have traditionally been regarded as a common heritage” (Pollan). The patenting and licensing of GM plants (or, technically, the “novel genetic structures” contained in their cells) have overthrown this assumption almost overnight.

Critics and reviewers have pointed out that in *All Over Creation* “good” and “evil” seem to line up a little too neatly with the farmers and activists on one side and biotech corporations on the other; after all, the same character occupies the roles of rapist and Cynaco spokesman.⁸⁸ There is certainly some comfort, Molly Wallace points out, “in finding the ‘wrongness’ of

⁸⁸ See, for example, Susan McHugh’s previously cited article, Claire Dederer’s review “Instead of Potatoes” in the 16 March 2003 issue of *The New York Times*, and the review “Spud is Thicker Than Water” in the 28 June 2003 *Observer*.

genetically modified foods, not in the organisms themselves, but in the context surrounding them (167). In *Multitude*, Michael Hardt and Antonio Negri offer just such an economic critique in place of an intrinsic moral one:

Some have sounded the alarm that genetically modified Frankenfoods are endangering our health and disrupting the order of nature. They are opposed to experimenting with new plant varieties because they think that the authenticity of nature or integrity of the seed must not be violated. To us this has the smell of a theological argument about purity. We maintain, in contrast, as we have argued at length already, that nature and life as a whole are always already artificial Like all monsters, genetically modified crops can be beneficial or harmful to society. . . . The primary issue, in other words, is not that humans are changing nature but that nature is ceasing to be common, that it is becoming private property and exclusively controlled by its new owners. (183–84)

In this reading, an economic critique (nature “is becoming private property”) supersedes the biological and/or ecological critique (“the authenticity of nature”) without any necessary reference to larger debates of boundaries or purity. If genetically modified food is “wrong,” it is because corporate control is wrong, and “not because intervening in nature is wrong.” (Wallace 167). Indeed, echoing just this sort of extrinsic approach, Haraway finds objections to the transgenic organisms to be symptomatic of a “suspicion of the mixed,” which produces a “mystification of kind and purity akin to the doctrines of white racial hegemony” in the U.S., challenging anti-GMO rhetoric by calling its own “purity” into question (*Modest_Witness* 61). Even more recently, Haraway has asserted bluntly that “transgenics are not the enemy” (*Companion Species Manifesto* 11).

Despite these critical gestures towards open and productive nature/culture partnerships, legal issues of control and ownership are redefining what can be considered “nature” or “culture” with little regard for larger cultural, moral, or even scientific considerations. For many, even non-activists and non-farmers, this tension came to a head with news of the creation of genetic use restriction technology (GURT), more commonly known as the “Terminator gene.” Developed by the U.S.D.A. in partnership with seed company Delta and Pine Land, “the Terminator” is a combination of genes that can theoretically be spliced into crop plants and cause every seed produced by those plants to be sterile, effectively shackling growers to annual company-controlled seed purchases.⁸⁹ The use of Terminator could “allow companies like Monsanto to privatize one of the last great commons in nature — the genetics of the crop plants that civilization has developed over the past 10,000 years” (Pollan). *All Over Creation*’s Lloyd Fuller is finally goaded into an alliance with the Seeds when he learns about Cynaco’s own Terminator technology, calling it a “blasphemous contraption” created by “corporations that claim to control the patent on life” (302). “They claim it is necessary to protect their ‘investments,’ their ‘intellectual property rights,’ their novel seed patents,” he thunders. “Mrs. Fuller and I say this: *God holds the only patent!* ... And He has given up His seeds into the public domain!” (302, emphasis original). Lloyd’s outrage has its roots in the anxieties present in the very earliest works of science fiction: he fears, as Giovanni does in “Rappaccini’s Daughter,” a natural world “no longer of God’s making, but the monstrous offspring of man’s depraved fancy” (Hawthorne 2280).

Lloyd frames his objections in such explicitly Biblical rhetoric because, as Lawrence Buell points out, toxic discourse is necessarily a product of its cultural context, and thus it “may

⁸⁹ It is important to note here that GURT was intended to protect surrounding non-GM plants (and especially certified organic fields) from cross-breeding as well as to safeguard patented genes.

repress, fail to fulfill, or swerve away from itself according to the drag of other discourses with which it cross-pollinates”; the less certainty there is about a new technology like Terminator genes, the more susceptible the discourse is to “swerving” (51). Lloyd, like all of the characters in *All Over Creation*, fills this ontological gap with what he already believes “about morality and reproduction, about multiculturalism and diversity, about God and Nature, about corporations and toxic chemicals” (Wallace 161). His response, for the purposes of this dissertation, serves to underscore both the durability of toxic discourse in the face of new modes of transgenetic engineering and to the ways that the Frankenfoods of science fiction have cross-pollinated with twenty-first century mainstream fiction.

The Seeds organize an “Idaho Potato Party” (billed as an updated Boston Tea Party), on the Fuller’s property, bringing together their countercultural allies, the Fullers’ conservative, rural customers, television and print reporters, and Cynaco’s private investigators and PR man. The day comes to a dramatic climax when the Seeds, Lloyd, and his grandchildren walk into the Quinn’s NuLife field and tear out the young plants; Will grudgingly agrees to have them arrested for trespassing. The ensuing media coverage has mixed results. The Seeds are released, but Lloyd has another heart attack when he sees Elliot Rhodes (his daughter’s statutory rapist and the “Terminator” of her first pregnancy) on his television. Cynaco’s involvement in the debacle leads to a muckracking investigation that eventually causes them to discontinue their Terminator research.⁹⁰ Geek reads the headlines vaunting the shelving of Terminator research and sighs. “It’s completely meaningless,” he tells Yummy. “They’ll just quietly continue with the R&D,

⁹⁰ In reality, Terminator genes are also not in use outside of research labs. Strident opposition from farmers, NGOs and governments resulted in a de facto moratorium on the field testing and sale of “terminator seeds” in 2000; the United Nations Convention on Biological Diversity re-affirmed and strengthened the language of the moratorium in March 2006 (“Moratorium”).

and when it's ready to take to market, they'll announce they've changed their minds again." He declares nature "over" (399).

In a rhetorical turn from lightly comical "Frankenspuds" to outright apocalypticism, Geek orders Yummy to "picture the whole world as a garden, teeming with millions upon millions of flowers and trees and fruits and vegetables and insects and birds and animals and weevils and us. And then, instead of all that magnificent, chaotic profusion, picture a few thousand genetically mutated, impoverished, barren, patented forms of corporately controlled germplasm" (409). Geek's doomsday vision of a "barren" world ties his fears back to the dread of sterility so pervasive in the toxic narrative, and explicitly links "corporate control" to the loss of the "magnificent, chaotic profusion" of a pre-technological nature. Ozeki is tapping (or at least or working in parallel fashion to) a rich SF vein of ecological extrapolation: since the 1960s, SF writers have explored the implications of rethinking ecological narratives and envisioning prospective green technologies, from genetic engineering to alternative energy production. Notable works in this mode include Ernest Callenbach's *Ecotopia* (1975), and much of Ursula K. LeGuin and Kim Stanley Robinson's fiction.

In *All Over Creation*, monoculture and the corporate forces that encourage it are more frightening than the technology wielded by those corporations. After all, for all the Seeds' supermarket stunts, it is Cynaco's shady business practices (infiltration of activist groups, spying on and suing farmers for patent infringement, and libel cases against critics) that prompt the journalistic exposé that shuts down their Terminator research. In the end, the text offers no easy answers and no pat solutions to the prospect of "Frankenfoods." The novel ends with ambiguous depictions of GM plants "alternately threatening and improving the quality of human life" (McHugh 42). The Seeds concoct a nonprofit solution for the propagation of the Fullers' seeds,

countering corporate control of patented seeds with a web-based co-op seedbank: the novel, however, then implies that this solution might not work. The Seeds themselves are not without sin: when they tear the NuLifes out of Will Quinn's fields, he responds quietly: "I thought I'd feel angry, but it just hurts me to see. How can they be so disrespectful of all those plants?" (306). His decision to plant NuLifes does, in fact, result in a child for his family: he and Cass adopt the baby of Frank and a Québécoise Seed named Charmy. Even the novel's final image, a photograph of Frank holding a sign that reads "RESISTANCE IS FERTILE!", contains the germ of an ironic double meaning (416).

Ozeki's work, if not overtly science fictional, has much in common with the narrative and generic strategies that Richard Powers employs in his novel *Gain*. *All Over Creation* attempts to "make sense of an abstract and globalized food system via the interpersonal, the intimate, and the everyday," employing data from vernacular sources – seed catalogs, cookbooks, popular magazine articles (Carruth 153). In contrast to *Gain*, however, *All Over Creation* emphasizes subjective experience over the kind of scientific specificity that fascinates Powers. As reviewer Judith Beth Cohen notes, the novel incorporates so many competing experiences and points of view, including "zany characters [who] often compete with her political message," that a reader is left to wonder if Ozeki, like Powers, is truly warning us of the consequences of technological escalation, or if "she simply having fun with the messianic self-righteousness of her activist creations" (6). "Disconcertingly," Cohen concludes, "the answer seems to be both" (6). The transgenic plants in *All Over Creation* are neither "an alien invasion nor product of/for salvation"; by problematizing both the "heroes" and "villains" in the GM debate, Ozeki attempts "to represent a struggle over the many meanings for GMOs" (McHugh 37). This approach, in all its complexity and ambivalence, stands in clear contrast to the tidy, boundary-affirming morals

of older monster-plant stories. NuLifes and NewLeafs may be a symptom of a broken relationship to our food, but they themselves cannot simply be labeled as the enemy.

The Windup Girl

Paolo Bacigalupi's 2009 science fiction novel *The Windup Girl* also depicts a landscape threatened (and potentially redeemed) by genetic modification; in Bacigalupi's text, however, the apocalyptic scenarios envisioned by Geek or Lloyd Fuller are historical fact rather than pessimistic predictions. Like Ozeki, Bacigalupi sets up clear villains and clear heroes, but ultimately declines to provide simple "green" ideological alternatives to complex systems of capitalistic global agriculture, laboratory research, and subjective individual experience. *The Windup Girl* instead foregrounds psychological and societal contradictions, ranging from nostalgic naïveté to willful hypocrisy. The novel's characters struggle to adapt to economic and ecological change, and "appear caught in a space between a disintegrating paradigm and a still amorphous paradigm yet to emerge in its place" (Hageman 293).

The novel's "still-amorphous paradigm" is closely related to the SF subgenre of cyberpunk, which rose to prominence in the late 1980s with the publication of William Gibson's *Neuromancer* (1984). Cyberpunk writers, including Greg Egan, Tony Daniel, Justina Robson and others, "tell stories set in universes where near-immortal characters flit back and forth between organic, mechanical, and virtual bodies, essentially at will" (Levy 75). At their most extreme, these stories of human transformation physically or metaphorically abandon the organic body, or depict it as just one of many ways in which agential existence is possible. Reacting against the body-phobic technological fetishism of cyberpunk, stories described variously as

“biopunk,” “agripunk,” “ribofunk,” and “greenpunk” emerge around the turn of the twenty-first century.⁹¹ These narratives explore themes of biological and genetic (as opposed to surgical or cybernetic) bodily alteration, and the resulting social and economic repercussions of those changes. Paul Di Filippo, a prominent biopunk writer, writes in his “RIBOFUNK: The Manifesto” (1998) that “the next revolution – the only one that really matters – will be in the field of biology. To paraphrase Pope, ribofunk holds that: ‘The proper study of mankind is life.’ Forget physics and chemistry; they are only tools to probe living matter. Computers? Merely simulators and modelers for life. The cell is King!” Although biopunk has not achieved the prominence of cyberpunk, its emphasis on biological processes and the centrality of the embodied self influence a growing movement within SF which attends to the GM revolution.

In a 2011 interview with James Long, Bacigalupi weighed in on the matter of genre-coding his work, including *The Windup Girl*:

At one time, when I was asked, I thought I rather liked the term “Agripunk” for stories like [Bacigalupi’s short story] “The Calorie Man” and *The Windup Girl*, because while bioengineering is central, the thing that I care about is the interaction between genetic engineering, food, intellectual property and big agricultural corporations. Ultimately, though, when I think about the kind of science fiction I write, I think of it more as fear fantasies, of “if this goes on,” stories. (“Interview with Paolo Bacigalupi – Part 2”)

Again, as in *All Over Creation*, the “fear fantasy” is not the bioengineering itself, but a capitalistic, corporate context in which new life forms become private property.

⁹¹ The term “biopunk” is also used to describe the loose subculture of “biohacker” hobbyists who experiment with DNA and other aspects of genetics, often in their home kitchens and basements, and lobby for the “opensourcing” of genetic data and research.

In the future-history of *The Windup Girl*, roughly three generations from now the debauched Expansion (our present day) collapses swiftly, an event referred to as the Contraction. The events of novel take place in the tentative early days of the Second Expansion. Humanity and its crops have been decimated by climate change, economic collapse, and an endlessly mutating array of plagues set loose by rival bio-tech and agricultural corporations. Calories, not money, now control economies – in a post-petroleum world, machinery is powered by springs, treadles, and genetically engineered elephants and “New People.” Only two true centers of power remain: the Des Moines-based Midwest Compact (a loose alliance of agri-tech “calorie companies”) and Bangkok, Thailand.

Protected from rising seas by complex levees and from the calorie companies by embargoes and a carefully guarded seed bank, the Thai Kingdom prospers. Because most of its seed bank’s stock are non-Western varietals, Thai “generippers” are able to maintain their nation’s independence from the calorie companies by creating crops resistant to both calorie plagues and an increasingly extreme climate. As one character notes, the Thai government has “been clever where others are not. It thrives while countries like India and Burma and Vietnam fall like dominoes, starving and begging for the scientific advances of the calorie companies”: in Bangkok, “all things seem possible. Fruits and vegetables return from the grave, extinct flowers blossom on the avenues, and behind it all, the Environment Ministry works magic with the genetic material of generations lost” (Bacigalupi 3, 4). The novel cycles between four central characters: Jaidee, a charismatic officer of the Thai Environmental Ministry’s elite “White Shirts”; Emiko, a GM human specially bred and trained to serve the aging, increasingly childless Japanese; Hock Seng, an ethnic Chinese refugee and deposed capitalist; and Anderson Lake, an undercover operative for the AgriGen calorie company.

The Windup Girl depicts the calorie companies – AgriGen, PurCal, Total Nutrient Holdings, and China’s Red Star – as clear villains (at one point, their representatives swan around in scarlet cloaks emblazoned with company crests), and their official narrative of “ending world hunger” as just so much self-serving PR. Jaidee’s lieutenant Kanya curses “the *farang*,” “calorie men with their active labs and their carefully cultured crop strains that would feed the world. Their modified animals that would work so much more efficiently on fewer calories. The AgriGens and the PurCals who claimed that they were happy to feed to world, to export their patented grains, and then always found a way to delay” (211). Anderson’s cover in Thailand is ownership of a potentially revolutionary spring company, which is attempting to engineer algae coatings that will enable factories to cram even more energy into metal springs. He tries to justify the takeover of the factory to its designer and owner, who cynically notes that “Calorie companies have a certain reputation”:

“Where are you going to get the calories to wind your fancy kink-springs if a crop fails? Blister rust is mutating every three seasons now. Recreational generippers are hacking into our designs for TotalNutrientWheat and SoyPRO. Our last strain of HiGro Corn only beat weevil predations by sixty percent, and now we suddenly hear you’re sitting on top of genetic gold mine. People are starving – ”

Yates laughed. “Don’t talk to me about saving lives. I saw what happened with the seedbank in Finland.” (6)

Bacigalupi never explicitly lays out the history of “the seedbank in Finland,” but it seems that at some point during the upheavals of the Contraction, calorie companies attempted to infiltrate and

force open a massive Scandinavian seed bank.⁹² The Finns discovered the plot and detonated the vault rather than allowing it to fall into the corporations' clutches. They publicly hang "calorie men" until their revolt is put down by company troops.

As in *All Over Creation*, a corporately controlled system of agriculture and science is in direct conflict with a religiously inflected environmentalism. In the West, "Grahamites" proselytize for their religious heroes, Noah and Saint Francis of Assisi. They have their own version of the Bible that includes anti-GM "Niche Teachings": "Food should come from its place of origin, and stay there," a Grahamite preacher explains. "It shouldn't spend its time crisscrossing the globe for the sake of profit. We went down that path once, and it brought us to ruin" (93). Grahamites also famously burn fields, a truly outrageous act in a time of shortages and starvation. In Buddhist Thailand, supplicants pray to "biodiversity martyr" Phra Seub (who placed the Thai seed bank under the protection of Buddhist monks) and King Rama XII, the visionary builder of the massive system of pumps and seawalls that keeps Bangkok from drowning. There is also a widespread belief that *phii* (the spirits of the dead) are unable to reincarnate "because none of them deserve the suffering of this particular world" (82). The Buddhists and Grahamites co-exist, but warily; their uneasy alliance is symbolized by Bangkok's sacred *bo* trees, almost entirely wiped out by ivory beetle infestations and calorie-company plagues that target fig trees. Jaidee thinks of the dead *bo* trees and weeps, wondering if his great-grandchildren will "even know that *bo* trees existed... that there were many trees, and that they were of many types? Not just a Gates teak, and a generipped PurCal banana" (168). He remembers the Western ecological evangelists he has known:

⁹² Probably inspired by the Svalbard Global Seed Vault, located deep in the permafrost of a mountain on Spitsbergen Island, Norway. The vault began operations in 2008 with the goal of preserving the seeds of food crops (approximately 1.5 million distinct seed samples) for hundreds of years (Kinver).

Grahamites who preach on the streets of Bangkok all talk of their Holy Bible and its stories of salvation. Their stories of Noah Bodhisattva, who saved all the animals and trees and flowers on his great bamboo raft and helped them cross the waters, all the broken pieces of the world piled atop his raft while he hunted for land. But there is no Noah Bodhisattva now. There is only Phra Seub who feels the pain of loss but can do little to stop it. (169)

It speaks to the centrality of plant life in *The Windup Girl* that in this revisionist version of the Flood, Noah's ark rescues plants as well as animals. However, a story of global salvation and renewal seems to have no place in Jaidee's world: "there is no Noah Bodhisattva now."

In a meeting with Akkarat, the Kingdom's expansionist Trade Minister, Anderson reveals that the Midwest Compact is desperate for its own renewal, in the form of new genetic material. "We've exhausted many of our options and the plagues keep mutating," he admits. "If the world is going to keep eating, we need to stay ahead of cibiscosis and blister rust and Nippon genehack weevil" (151). Access to the Thai seed bank is the Compact's last remaining hope; the situation has reached a point so dire that they are even willing to offer a share of AgriGen's profits. Akkarat is not impressed: "You're saying that you yoked the world to your patented grains and seeds, happily enslaved us all – and now you finally realize that you are dragging us all to hell," he responds (151). Still, he agrees to betray the seed bank if the calorie companies support his coup. The novel ends with a pitched battle between the isolationist Thai Kingdom and the expansionist Midwest Compact that leaves Bangkok flooded at last and the Thai seed bank in exile with an underground network of Buddhist monks.

The fall of Bangkok marks an ironic recovery of genetic freedoms; dispersed, its seed bank is more secure than ever. It also completes a symbolic Edenic narrative. Early in the novel, Anderson finds a travel book with photos of “fat, self-contented fools” at Thai fruit markets, and is disgusted by “the waste, the arrogance, the absurd wealth” on display in the spectacle of small mountains of haphazardly piled fruit: “So many of these things are simply gone,” he thinks to himself, “But these people in the photo don’t know it. These dead men and women have no idea that they stand in front of the treasure of the ages, that they inhabit the Eden of the Grahamite Bible where pure souls go to live at the right hand of God. Where all the flavors of the world reside under the careful attentions of Noah and Saint Francis, and where no one starves” (64). As in earlier SF toxic narratives, complacency and ignorance are the cardinal sins committed by both scientists and consumers.

Even in flowering Bangkok, deprivation and sterility are omnipresent fears. Like the calorie companies’ seeds, Emiko (the “windup girl” of the title) was designed to be sterile. Although she is created as a sort of especially skilled and treasured pet, her owner callously discards her during a trip to Thailand after it makes more sense to upgrade to a new model in Japan than pay to ship Emiko back home. Patronless, she is now categorized as a “genetically transgressive” invasive species and subject to immediate “mulching” if she is captured by the Thai environmental ministry. Her existence is entangled in a complex web of cultural significations. In Japan, she is a wonder, “more Japanese than the Japanese,” but still an object to be bought and abandoned at will. To the average Thai, she is merely “an illegal piece of genetic trash,” and yet “with stamps and a passport, she was not a transgression against niche and nature, but an exquisite valued object” (129, 106). To Grahamites, Emiko is a devil; to Muslims, an “affront to the Q’ran”; and to Buddhists, “a creature unable to ever achieve a soul or a place in

the cycles of rebirth and striving for Nirvana” (35). Approximating a GM plant in our present-day food supply, Emiko is only acceptable so long as she can “pass” as normal and non-engineered, mimicking various interpretations of what it means to be a “natural” human.

Emiko embodies our ambivalence regarding genetic engineering; she is abandoned by her creator, left to fend for herself in a hostile world, and brutally rejected and exploited by “real” humans. The novel’s “cheshires” are another techno-artefactual link between science, nature, and culture, reminding the reader how literature can affect and shape the practice of science (and by extension, ecology). These color-shifting cats were created by a calorie executive as party favors for a daughter’s *Alice in Wonderland*-themed birthday party; “within twenty years, the devil cats were on every continenet and *Felis domesticus* was gone from the face of the world, replaced by a genetic string that bred true ninety-eight percent of the time” (27). The uncontrollable spread of the cheshires made generippers more cautious about allowing their future GM creations to retain the ability to breed. “If her kind had come first,” Emiko thinks to herself,

before the generippers knew better, she would not have been made sterile. She would not have the signature tick-tock motions that make her so physically obvious. ... Without the lesson of the cheshires, Emiko might have had the opportunity to supplant the human species entirely with her own improved version. Instead, she is a genetic dead end. Doomed to a single life cycle, just like SoyPRO and TotalNutrientWheat. (114)

As my earlier chapters have shown, issues of reproductive potential and dysfunction have historically been an important part of the toxic narrative in science fiction. The threat of New People and cheshires as superior “successor species” is reminiscent of the Children in *The Food of the Gods*. Even earlier in the history of the genre, Victor Frankenstein balked at creating a

mate for his creature, “fearing that they would go forth, be fruitful and multiply, and then annihilate the human race” (Hageman 298). Emiko, does, in fact, represent the only rational hope for human survival in a rapidly decaying environment. Her designers have endowed her with preternatural strength and reflexes, perfect eyesight, disease- and cancer-resistant cells, hair that will never go gray, and longevity.

Gibbons, a renegade generipper harbored by the Thai Kingdom, lectures Kanya that “We should all be windups by now” (243).⁹³ Those who hate the New People “paint them as a threat to an essential humanity without reflecting on whether that essential humanity is an idea that can be sustainably preserved” (Hageman 295). The novel, through Gibbons, is skeptical about nostalgia for a pre-techno-mediated human identity. “It’s easier to build a person impervious to blister rust than to protect an earlier version of the human creature,” Gibbons explains. “Yet you refuse to adapt. You cling to some idea of a humanity that evolved in concert with your environment over millennia, and which you now, perversely, refuse to remain in lockstep with” (243). In the context of the scene, Gibbons’s reprimand is meant to be distasteful; Kanya, whose point of view frames the speech, is physically overwhelmed by the anger and disgust she feels toward the *farang* geneticist. Yet Gibbons is one of the only characters who understands that, in the face of constantly shifting environmental, chemical, and genetic threats, survival is ultimately incompatible with either the containment strategies of the Environmental Ministry and calorie companies or the ecological nostalgia of the Grahamites.

It is perhaps the central irony of the novel that GM technology is simultaneously the cause of and solution to this fall from nature. Gibbons and the Thai generippers represent

⁹³ Gibbons’s name evokes both Edward Gibbon, author of *The History of the Decline and Fall of the Roman Empire*, and cyberpunk pioneer William Gibson.

humanity's best hope to, as the Grahamites promise, "restore Eden" using "the knowledge of ages to accomplish it" (92). The novel ends with Gibbons promising to give Emiko the ability to reproduce. "Nothing about you is inevitable," Gibbons assures Emiko. "Someday, perhaps, all people will be New People and you will look back on us as we now look back at the poor Neanderthals" (358). Ultimately, however, it is unclear which side we are supposed to sympathize with: the Grahamite longing for the restoration of a pristinely pre-technological world, or a techno-futurist Eden with Emiko (or at least her DNA) as the new Eve of a genetically enhanced humanity. Gibbons clearly advocates the latter, deriding Thai genetic quarantines and embargoes and Grahamite Niche Teachings as symptoms of the same naïve romanticism:

"The ecosystem unravelled when man first went a-seafaring. When we first lit fires on the broad savannas of Africa. We have only accelerated the phenomenon. The food web you talk about is nostalgia, nothing more. Nature." He makes a disgusted face. "*We* are nature. Our every tinkering is nature, our every biological striving. We are what we are, and the world is ours. We are its gods. Your only difficulty is your unwillingness to unleash your potential fully upon it" (243).

Gibbons articulates the dueling conceptions of nature in the novel – either romantically prelapsarian, or irrevocably fallen, mediated, and controlled. His "gene ripping" serves as "a proxy for contending concepts of sustainable agriculture, even of nature itself" (Levidow 55). Gibbons promises to overcome the problems of life in a technologically compromised nature by further technologizing it, while the Environmental Ministry fears the prospect that his tinkering will generate new terrors that may exacerbate those that humanity already faces. Gibbons, therefore, is not "a simple role model of ecologically-minded hospitality toward which we should

aspire” (Hageman 297). Although, unlike most of his mad-scientist predecessors in the genre, Gibbons acknowledges and even takes responsibility for the repercussions of genetic meddling, he also clings to a hubristic rhetoric of god-like power. “If you would just let me be,” he complains to Kanya, “I could be your god and shape you to the Eden that beckons us” (243). Only Emiko, and not the “real” human denizens of Bangkok, seems willing to take him up on his offer.

The Windup Girl also reflects the tensions present in our present-day depictions of the artificially modified genes of plants. The novel’s biotechnology is a capitalistic and industrialized response to “external threats from an untamed, wild nature” (Levidow 57). On one hand, its creations are plagues, imaginistically tied to earlier iterations of toxic threats through rhetoric describing their presence as the “contamination” and “pollution” of a presumably pristine pre-existing gene pool.⁹⁴ On the other hand, those same plants have a heroic role as hardy survivors, perhaps even saviors, in times of disease, drought, and famine. The narrative concludes not with a return to an idealized, pre-technological nature, but with a flood that provocatively rewrites the Judeo-Christian flood narrative. The only survivors Bacigalupi shows us as poised to inherit the earth – Emiko, renegade Gibbons, and Kip (Gibbons’s transsexual lover) – are hardly a virtuous heterosexual human couple. As in *All Over Creation*, Bacigalupi’s novel depicts multiple “natures” in multiple, dialogic relationships, and its final chapter leaves open the possibility for a new ecological paradigm to emerge, a model of biotechnology and agriculture that combines laboratory genetics, human empathy and intuition, and a willingness to fearlessly embrace our role as “the lords of creation.”

⁹⁴ This is itself a simplistic and unexamined assumption about how gene flow occurs; for more on this rhetoric, and a study of “gene discourse” more generally, see Evelyn Fox Keller’s *Refiguring Life*.

Seed

Rob Ziegler's *Seed* (2012) even more starkly dramatizes this tension between depictions of GM crops as both perversion and savior. Like *All Over Creation* and *The Windup Girl*, *Seed* is ambivalent about the future of GM agriculture; surprisingly, this ambivalence extends to the oft-villainized centralized control of genetics. Set in an apocalyptic near-future United States, a series of "Hot Summers" and climactic shifts transforms the U.S. into a nation of nomadic migrant workers following the harvest and fleeing extreme weather. Highs of 140 degrees Fahrenheit and lows of -20 degrees are "not anomalous extremes" (Ziegler 19). The few sheltered elites are little more than window dressing for organized crime syndicates and the all-powerful Satori Corporation.

Satori began as a "bio-architecture" firm – their masterwork is a quasi-sentient "flesh amoeba" covering Old Town Denver, a grisly twist on the usual domed city. After the first Hot Summer, Satori shifts its focus to agriculture. This corporation becomes a city-state after it engineers a complete monopoly on viable seed stocks (reminiscent of the Midwestern agricorp governments of *The Windup Girl*). As in *The Windup Girl*, the anxieties in *Seed* center on sterility and deprivation. Individually barcoded Satori seeds are doled out for each planting season; what's left of the U.S. government essentially exists only to manage the grain silos. Black-market seeds are used as currency, and counterfeits are a constant threat. The novel's main characters, two orphaned brothers called Brood and Pollo (their real names are Carlos and Bacillio, respectively), fight their way across the deserts of the Midwest, hoping to reach the relative safety of an American Indian settlement before the onset of winter.

To a greater extent than the other novels examined in this chapter, *Seed* spends a significant amount of time explaining its genetic technology. The mechanisms in use revolve around splicing, grafting, and hybridity, creating a technology that is more messy and organic art than sterile laboratory practice; the Satori dome itself is “a composite,” spliced together from “DNA is built from many different sources, some of them plants” (111). It breathes and excretes through its skin, grows fur in the winter, sheds that fur in the summer, and creates its own energy via photosynthesis. At times, the splicing carried out inside Satori seems almost mystical. The process is carried out by two genetically engineered quasi-human beings, Sumedha and Pihadassa, sibling/lovers who can sense the structure of DNA and alter it by communicating directly (and sometimes telepathically) with the Satori dome. Sumedha describes his work as an act resembling religious supplication: “Ask the question and the helix would answer. Life would answer. He felt his way along the helix’s length, not analyzing, merely intending. The helix sometimes recombined itself, independent but in sync with him, a rebellious dance partner at whose insights he could only marvel” (50). Once the helix “answers,” however, the steps become more grisly: Sumedha’s experiments graft human body parts together like plant cuttings (“the arm broke off, easy as an aloe stem”), and raw materials ooze from various pores and orifices in his operating rooms (126).

Although Sumedha and Pihadassa are themselves sterile, their gene splicing is strongly associated with maternity and fecundity. Pihadassa, created with “compulsions to practice agricultural eugenics,” is widely referred to as “the Corn Mother” (113). For his part, Sumedha is more intent on working with animals and his “children,” the humanoid “landraces” who provide most of the physical labor for Satori. The Satori dome is itself a “she,” at one point described as “a mother’s womb shielding the city and its children from the mad seasonal swings of a climate

knocked from its axis” (52). More generally, mothers are frequently identified with gardens throughout the novel. Brood’s first memory of his mother is gardening with her in a ramshackle greenhouse. Pihadassa, “the Corn Mother,” defects from Satori and flees to a Nebraska valley where she founds Garden City. Although it is short-lived (quickly crushed by Satori enforcers and the remnants of the United States Army), Garden City embodies the utopian promises of GM agriculture – a world without resource depletion, famine, or disease. In a time of almost universal starvation, it is Edenic, boasting five harvests between March and September and nutritious meals that literally fall from the trees. Garden City also recalls, in many ways, the optimistic forms of genetic engineering depicted in Octavia Butler’s *Xenogenesis* trilogy and Joan Slonczewski’s *Elysium Cycle*; like Garden City, these works offer gentler, more positive versions of genetic engineering, in which powerful, peaceful “gene traders” and “lifeshapers” use their knowledge to transform humanity repair damaged ecosystems.⁹⁵

If maternal gardens hold out the utopian promise of fulfillment and safety, then patriarchy is identified with loss, absence, and abuse. Young men are brutally exploited by various father figures, from gang leaders to their military superiors; Brood and Pollo lose their mentor Hondo early in the narrative and spend the rest of the novel fending off press gangs. The other significant paternal characters keep themselves strictly apart from their “children”: the “Satori Fathers” – the company’s founders – are kept alive in womb-like pods hanging in Satori’s central chamber. They are part of the dome, “but in the barest mechanical way. They had suckled life from her [the dome], but they had not been aware of her, had never *joined* with her” (255). In stark contrast to the “hands-on” relationships between Pihadassa, Sumedha, and their “children,” the Fathers embody a deeply estranged displacement of patriarchal authority. They

⁹⁵ In Butler’s novels, however, the benefits of “gene trading” are still accompanied by the specter of loss – of identity, of self-determination, of the very concept of “humanity.”

are represented by Bill Coach, founder and CEO of the Satori Corporation, who is the only Father who speaks clearly during the course of the narrative. Coach is an updated and re-contextualized entry in the mad scientist tradition; he is a trained climatologist, but was also a CEO of Monsanto (although the board voted him out within a year). In an interview recorded during one of the early Hot Summers, he rants that his former agribusiness colleagues are

“way behind the curve. Their production’s still oil-based, for Christ’s sake. And they’re still talking in terms of drought resistance.” He shook his head. “Five degrees Celsius in under half a century, that’s not a goddamned drought. We’re talking a completely different ball-game. A new environment. And it’s only getting worse. Better crop production’s just a baby step. Short term. And it won’t ever be anything more than a stopgap. The endgame is, we need to change ourselves.... Not morally or ethically. *Fundamentally*.” (112)

Before retreating into their protective pods, the Fathers direct Sumedha to design a genetic graft that will allow them to emerge from their stasis as transgenic humans who are “fit for this world. Made for it” (175). Their goal is essentially the same as Gibbons’s in *The Windup Girl*: to recreate themselves as a “successor race,” replacing with new and more robust models the human bodies which are no longer able to survive in the world their techno-science has created.

Sumedha’s attempts to build the graft from scratch have all failed, inflicting horrifically painful deaths on the landraces on whom he tests it. Desperate for success, he secretly infects the Satori seed distributions with “Crop Graft 3,” which should respond to any naturally occurring genetic configurations “stable enough to maintain the organism identity when combined with a splice causing heightened adaptability” (98). Anyone who consumes Satori seed and has “the proper genetic configuration” will be unaffected by the physiological effects of “Crop Graft 3,” a

condition popularly referred to as the Tet (short for tetanus). Everyone else will die horribly. Sumedha eventually realizes that the Fathers' plan is deeply selfish – not because they are willing to kill millions of innocent people if it gives them a chance at health and longevity, but because they will abandon Satori once their grafts are complete. “Satori will die,” Sumedha realizes, “– and the Fathers do not care” (133). Heartbroken and enraged, Sumedha pulls the Fathers from their pods and attempts to meld his own body and consciousness with Satori. The dome, however, seems to require a “true” human symbiont; it is ultimately the autistic child Pollo, forgotten in one of Sumedha's labs, who spontaneously generates the physical and psychic bond Satori needs.

The Fathers are unable to appreciate the agency of their own creations; to them, the Satori dome and even Sumedha and Pihadassa are merely disposable tools. The novel ends with the death of the Fathers and the old order of the Satori Corporation. Their centralized and profit-driven authoritarianism is replaced by a child's benevolent, symbiotic meld with the Satori dome. Satori lives on not as a business but as a corporeal being, truly independent and fully sentient. Brood, the lone surviving character who rejects the protection of the new Satori, happily rides off into the desert sunset. In its conclusion, *Seed* retains the common sci-fi trope of the outlaw “last man” maintaining his independence from any centralized authority; more daringly, however, the novel leaves that centralized authority whole and in place. Satori, like the seeds and grafts she produces, is not inherently depraved – with properly empathetic leadership, Ziegler suggests, biotechnology companies like Satori (or real-world analogues like Monsanto) need not be a metonym for ecological apocalypse.

Ultimately, all the twenty-first-century texts in this chapter reflect a larger cultural ambivalence regarding GM crops; they reject any heroic rolling-back of genetic changes, and

instead find a strange, uncanny beauty in their created, artificial landscapes. Their engineered plants and foods are often presented as both monstrous and beautiful, in addition to being “unnatural.” Alaimo has pointed out that portrayals of truly monstrous nature, like that seen in *The Fungus*, insist on the reinforcement of a strict nature/culture divide, and yet “the very thing that these creatures embody as horrific – the collapse of boundaries between human and nature – is what many theorists promote” (“Discomforting Creatures” 280).⁹⁶ The beauty that the novelists find in these genetically modified organisms supports this more complex reading, and adds both historicity and depth to the ongoing debate surrounding the future of GM plants.

This debate is itself in an interesting moment of transition. In recent years Monsanto and other biotech corporations have responded to consumer anxieties about GM foods by cultivating “a quasi-pastoral image of transgenic seeds” (Carruth 15). Marketing material downplays the high-tech aspects of GM plants in favor of their “artisanal” qualities, with images that depict “the continuity of the organic world and agricultural biotechnology” (ibid). In one particularly fascinating move, Monsanto has been quietly shifting resources into “traditional” cross-breeding. A glossy, lavishly photographed article in the February 2014 issue of *Wired* details the company’s quest “to create vegetables that have all of the advantages of genetically modified organisms without any of the Frankenfoods ick factor” (Paynter 91). The genetic modification of fruits and vegetables (as opposed to large-scale commodity crops like corn and soy) is inefficient and expensive – Monsanto estimates that adding each new gene requires roughly ten years and \$100 million – and is much more likely to put off consumers. Instead, Monsanto biologists are crossbreeding plants with desirable traits, sifting through the offspring

⁹⁶ Carolyn Merchant’s “partnership ethic,” Bruno Latour’s and Michel Serres’s actor-network models, and Donna Haraway’s cyborg constructions are both relevant to this reading of GM crops as boundary-collapsing cultural agents.

genomes for known markers for the traits, and then growing only the plants with those markers until they breed true. “Nobody inserts a single gene into a single genome,” the article’s author declares. The proprietary new hybrids “may be born in a lab, but technically they’re every bit as natural as what you’d at get a farmers’ market. Keep them away from pesticides and transport them less than 100 miles and you could call them organic and locavore too” (Paynter 93, 91). In the past four years, Monsanto subsidiary Seminis has quietly launched Beneforté broccoli, BellaFina peppers, Frescada lettuce, and several other novel proprietary strains into grocery store produce sections around the world.

The lack of any outcry over (or even awareness of) these next-generation technological food crops might be seen as representative of larger trends in the United States; the “ick factor of Frankenfoods” seems to be diminishing. In just the past five years, media coverage of GM food crops has plummeted, even as those crops have become ubiquitous in the North American food supply. Gallup’s last poll of popular sentiment on GM crops took place in 2005 (the results were evenly divided between support and opposition), and the Pew Charitable Trust’s Initiative on Food and Biotechnology went on hiatus in 2007. “It would seem that in the U.S., the conversation is essentially over—or at least quieted down,” Seth Porges wrote in 2013. “Today, most Americans either aren’t aware of the prevalence of GM food, or simply take it for granted.” Depending on one’s opinion about GMOs, this is either shocking complacency or a long-overdue decline of irrational objections; regardless, “the future” seems to have arrived.

Genetic engineering itself – the editing and remixing of DNA – remains deeply controversial, but as this chapter has shown, the narratives of GM plants reveal a fascinating ambivalence regarding their place in our world. The now widespread practice of genetically modifying our food crops – the foundation of one of our most intimate connections between self

and environment – manifests what Alaimo calls “the presumption of mastery” inherent in the technology and in predominant conceptions of genetics more generally (*Bodily Natures* 149). The popular understanding of genes as “mechanisms that can be turned on and off,” she writes, “encourages humans to assume techno-scientific mastery of all life forms” (149). In the same vein, Donna Haraway critiques the “gene fetishism” that involves “‘forgetting’ that bodies are nodes in webs of integrations” (*Modest_Witness* 142). The fetishization of the gene

places “the environment” – the entire material fabric of life, in other words – in the distant background where it plays little, if any, role. Take, for instance, the popular and scientific obsession with finding genetic causes for diseases, which blinds us not only to environmental causes, such as the thousands of toxicants that reside in our bodies and interact with each other in often unpredictable ways, but to the manner in which even the “genetic” causes are inextricably interwoven with and sparked by environmental factors. (*Bodily Natures* 150)

This complexity animates the emerging field of “toxicogenomics” or “epigenetics” – the scientific study of how environmental factors affect the genome and its expressions.⁹⁷ In contrast to the genetic determinism prevalent in most scientific (and popular quasi-scientific) discourses, epigenetics maintains that genes are not immutable, and that their instructions can be revised.

While science is beginning to formulate models for understanding the interpenetrations of genes and environments, language and literature are still struggling to find ways to express this relationship. In “Playing God in the Garden” Michael Pollan asks Harvard geneticist Richard Lewontin his opinion of the dominant metaphor in which genes act like the software for

⁹⁷ Sara Shostak’s *Exposed Science* (2013) documents the early twenty-first century scientific turn to questions of genetic susceptibility to toxic exposures, with particular emphasis on how this greater focus on individuals may potentially affect the placement of responsibility for toxic exposures.

organisms, powerful and yet easily re-written. “From an intellectual-property standpoint, it’s exactly right,” he replies. “But it’s a bad one in terms of biology. It implies you feed a program into a machine and get predictable results. But the genome is very noisy. If my computer made as many mistakes as an organism does [in interpreting the data of DNA] I’d throw it out.” When asked for a better model, he suggests the complexity of an ecosystem. “You can always intervene and change something in it, but there’s no way of knowing what all the downstream effects will be or how it might affect the environment. We have such a miserably poor understanding of how the organism develops from its DNA that I would be surprised if we don’t get one rude shock after another” (Pollan).

Most GM-monster narratives, including *The Fungus*, focus on these “rude shocks” – the unpredictable side effects, the righteous punishments inflicted on hubristic scientists, and the victimization of unsuspecting bystanders. The appeal of the more recent novels examined in this chapter is that they reject this tidy moralizing, pointing out that *not* embracing our ability to make our plants stronger, more nutritious, or more pest-resistant has ethical implications as well. As Emily Anthes writes in her book *Frankenstein’s Cat*, there are plenty of people speculating about the worst-case scenarios of genetic modification – “the glowing teenagers, the resurrected Hitlers, the killer cyborg armies.” “They’ve got the apocalyptic visions covered,” she concludes. “I’m ready to imagine an alternative future, one in which biotech brings hope and promise rather than anxiety and alarm” (177). The SF narratives in this chapter, while certainly full of their share of horror, locate precisely this “hope and promise” in GM crops.

Risk society and toxicology effectively normalize the “anxiety and alarm” of toxic wastes and GMO escapes by tacitly accepting that the present regime of technoscience will not change. Thus, everyone must “resign themselves to the fact that such dangerous by-products are a fixed

feature of the products delivered to them,” and this resignation “simultaneously naturalizes risk (turns it into an unavoidable background condition), socializes it (reduces it to a collective cost borne by all), and personalizes it (transforms it into a matter of lifestyle choice)” (Luke 248). Because the risk is “real” only to the degree it is known and interpreted, journalists, science writers, and media are imbued with great power. Overwhelmingly, these sources focus on highly specific, highly localized threats (tainted baby formula in China, for example, or bags of salad shipped on certain dates), and merely advise consumers to stay calm and perhaps adjust their shopping habits until the threat subsides. Science fiction, however, extrapolates these localized dangers into unignorable, worldwide disaster, insisting that its readers acknowledge and intellectually engage with the hidden world of chemicals in and around our bodies.

The growing awareness that there is no safe place, no perimeter that toxins cannot breach, can create feelings of isolation and helplessness. The ubiquity of toxins also renders it increasingly impossible for us to imagine that we can, if necessary, retreat to some pristine natural space to “detox.” No matter how stridently some toxic narratives insist that a pastoral or wilderness retreat holds the salvation of humanity, we can no longer, in good faith, take comfort in fantasies of “protecting nature” merely by creating areas in which “it” is “preserved” (Alaimo *Bodily Natures* 260). Indeed, in the context of modern monoculture and agri-business, and in the imagined presents and near-futures of the novels examined throughout this dissertation, the boundaries between the lab, the factory, and the field all but disappear.

The broad sweep of this dissertation has revealed that the frequent invocation of Eden in these most recent toxic SF novels is, then, a return to the mythic structures found in the very foundations of the science fictional toxic narrative. From Rappaccini’s treacherously poisonous garden, the narrative has transitioned to the GM Edens of *The Windup Girl* and the symbiotic

grafts of *Seed*. If the toxic narrative is generally one of anxiety and violation, the garden offers a counter-narrative in which human culture – cultivation – works alongside, rather than *versus*, nature. Accepting our role as conscientious gardeners rather than toxic avengers also has profound implications for environmental justice movements. As Alaimo points out, “Recognizing how the bodies of all living creatures intra-act with place – with the perpetual flows of water, nutrients, toxicants, and other substances – makes it imperative that we be accountable for our practices” (*Bodily Natures* 158). Stewardship of the toxic garden requires patience, modesty, and resilience, with an understanding of the limits and responsibilities of culture and well as those of biology.

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