

Introduction

IN A MADE-FOR-TELEVISION courtroom, an attorney approaches the jury and asks with sardonic smugness: “Is DNA *really* evidence?” Gesturing with her fingers, she places quotes around the word “evidence.” The members of the jury absorb the statement with blank expressions.

Within the context of a closing statement in a court of law, the lawyer’s gestures call attention to the long-standing tension between a faith in reasoned argument and a fear of the slipperiness of rhetoric. In fiction, in television, in pop culture, the courtroom’s symbolic promise of reason and justice is often strained by the presence of a lawyer, long a figure of those who use language and argument to, as Socrates said of the sophists, make the worse case seem the stronger. From the brief snippet of the lawyer’s appeal to the jury—a rhetorical question casting doubt on the value of DNA—we can gather that she is indeed one of those slippery sophistic types, one who is building her case on the contingencies of language, meaning, and interpretive context. We don’t really need to know anything more about the context of her statement to see that she is being preposterous; she is challenging the reality and truth-value of DNA within a court of law.

This is not a *real* courtroom scene. It is the opening scene of a television commercial. It is only five seconds long. The voiceover, a deep male voice reverberating with satirical severity, explains to the television audience: “For Jen, truth was relative.”

The commercial has nothing to do with genetics or with law (we are left to our own devices to make any connections we may want to any infamous court cases involving DNA evidence). It is part of a series of sharply funny commercials portraying the honest and reliable practices of Washington Mutual Bank. Each commercial uses absurd little skits to represent a client’s transformation from anxiety to trust, from dishonesty to honesty, or from miserliness to generosity. In this one, Jen the relativist lawyer is dramatically transformed from extreme relativism to extreme truthfulness, all from her experience with a bank where free checking really is free. Before her transformation, Jen is willing to challenge the ultimate truth of DNA. After her

transformation, Jen is so committed to absolute truthfulness that she pulls her car off the road to tell a police officer that she just changed lanes without signaling and that her license plates are expired.

Despite the virtues of post-transformation Jen and her newfound truthfulness, it is pre-transformation Jen who is of interest here. I borrow her courtroom, and her one-line skit, to introduce my own study of rhetoric and genetics. What better than a fictionalized courtroom (harking back to a scene so central to the texts of classical rhetorical theory), made for the ephemeral world of advertising, to dramatize the lessons we can learn about contemporary rhetoric if we pay attention to genetics. It is really the persistent and potent antithesis between rhetoric and genetics that can teach us. It can teach us not only about the way we communicate about genetics, and not only about the place of genetics in contemporary discourse, but also about the control and containment of rhetoric in contemporary culture.

The commercial dramatizes the rhetoric–genetics antithesis in the bold relief of a caricature. The caricature owes its snappiness in part to the idealized courtroom space, complete with mahogany wood, an impressive jury box, and a gallery rail marking off the public seating area. But despite the quality of the set and the quality of the performance, the DNA is what really makes it work. DNA is a readily available and easily recognized icon of truth—perfect for just this kind of skit. Replace the DNA with any other kind of evidence—witness testimony, fingerprints, photographs, or telephone records—and the skit just isn't as funny. Every other category of evidence comes with those prickly problems of context: what's the relationship of the witness to the defendant? how many other fingerprints were found? how do you demonstrate the relevance of the fingerprints or the telephone record? In contrast, DNA readily stands on its own as a context-independent reliable truth.

The commercial takes advantage of the pervasiveness and persuasiveness of DNA in contemporary culture, or what Dorothy Nelkin and M. Susan Lindee have dubbed the “DNA mystique” and the “gene as a cultural icon.” In Jen's courtroom, the DNA as metonym of truth and reality acknowledges, with a big fat wink, the mystique and iconicity of genetic material. But it is not only the iconic status that is caricatured in the commercial that is worthy of critical attention. It is also the bold antithesis that is in play. The commercial plays on and enforces the sense of a binary universe, with lying, a lawyer's rhetoric, and relativism on the one side and certainty, honesty, and genetics on the other. It is this rhetorical work—efficiently laying claim to an authoritative material reality while conjuring a boundary of immunity from the contingencies of language and rhetoric—that suggests that “genes” reside comfortably neither in the realm of rhetoric nor in the realm of rhetoric-free reality. Rather, “genes” are implicated in the boundary work of keeping the realms of rhetoric and reality in touch with, but still separate from, one another. In other words, it is the reiterative

antithesis of rhetoric and genes that suggests that “genes” themselves are worthwhile objects of rhetorical study.

Genes are biological objects: they are implicated in the biological processes of reproduction, development, disease, and cellular maintenance. Genes are scientific objects: they are objects (part material, part functional, part conceptual) that scientists use to study and comprehend genetic, biological, and evolutionary processes. Genes are economic objects: they are valuable commodities in agriculture, food production, medicine, and pharmaceuticals. Genes are political objects: they are sites of conflict of interests between privacy concerns and medical research, farming interests and corporate agriculture, cultural autonomy and population research; they are implicated in family law, criminal investigations, and international law.

Genes are also rhetorical objects. As biological, scientific, economic, and political objects, genes belong in the realm of rhetoric; that is, they belong in the realm of deliberation and debate. But it is not only as objects of debate and deliberation that genes are rhetorical. Within individual texts, genes are often invoked to close debate, to forestall deliberation, to ward off alternative interpretations. A mere reference to a gene can itself be a powerful argument, an appeal to truth, or a claim on greater significance. Thus, by saying that genes are rhetorical objects, I do not mean simply that we ought to talk about them, or that we ought to sort through their meanings. Rather, by saying that genes are rhetorical objects I mean that they do rhetorical work.

In this book, I examine the gene as a rhetorical object. That is, I examine the “gene” as a rhetorical invention and as a rhetorical figure. As a rhetorical invention, the “gene” was designed to do the same kind of work (laying claim to a reality and immunizing against unwieldy rhetoric) that DNA does in the courtroom skit of the commercial. As a rhetorical figure, the “gene” moves from context to context, adapting to a broad range of rhetorical exigencies (from the highly technical to the intensely political to the ephemeral and the absurd), carrying with it a capacity for rhetorical work and rhetorical consequences. As the examples in this book show, not unlike the DNA in the courtroom skit, the rhetorical consequences of the figure of the gene often include the assertion of boundaries, with authoritative knowledge on one side and playful language, stylistic devices, and rhetoric on the other.

The texts that I examine in this book include peer-reviewed scientific texts and popular-press articles, or what some might consider serious texts and fluffy or ephemeral texts. The scientific texts are the ones that aspire to a certain kind of literalism while the popular-press texts are free to stretch around in a kind of playful figuralism. Unlike the scientific texts, the popular-press accounts of genes (especially the headlines) are not constrained by any need to avoid accusations of being too figurative. Still, in both kinds of texts—in the ostensibly literal and the openly figurative—we can see the work of the figure of the gene.

I should say upfront that the goal of this book is not to evaluate the scientific legitimacy of any literal or figurative use of genetic language. Though the scientific legitimacy of particular language usage is not irrelevant to the analysis, the primary focus of this book is the rhetorical work of both literal and figurative uses of genetic language. In this book I am most concerned with paying close attention to the figurative and rhetorical work of genes and with using genes to learn to pay closer attention to figurative work in general. As Jen's skit with DNA in the courtroom suggests, this book is especially concerned with attending to the rhetorical work of fixing a sense of a reliable material truth and the rhetorical work of asserting boundaries between truth and rhetoric.

SOME MATTERS OF DEFINITION

So far, I have slipped around a bit with references to DNA, genetic material, and genes. These terms are not synonymous. For the most part, this book is more concerned with the rhetorical work of the "gene" as a figure than it is concerned with the persuasiveness of deoxyribonucleic acid. This is not to say that "genes" and "DNA" are not related. They are related. Very closely related. But the relationship between the two terms, and between the referents of the two terms, is anything but fixed and static.

DNA stands for deoxyribonucleic acid. As a name, it is fairly straightforward. It designates a distinct biochemical substance that is found in the nuclei of cells. Grammatically, in its literal form, DNA is a concrete noun. The "gene" is harder to define. It is semiotically tricky. In chapter three, I examine in detail the initial naming of the gene to show that when the gene was first named in 1909 it was not so much defined as it was established as a rhetorical figure—a figure for expressing a genetic concept as a material thing. After the name "gene" was introduced, geneticists grappled with its meaning and debated the nature of its signified (was it best to think of it as a material thing? a function? a concept? just a word?) (Vicedo). The material, functional, and conceptual associations have changed dramatically over the last century. But there has never been one singular precise definition or sense of what genes actually are. There is still no one sense of the term that really fixes it in a category of material thing, function, or concept.

Ruth Hubbard and Elijah Wald, in their effort to demystify the power of genes in public discourse, summarize the different uses and definitions of the term:

But what are genes? Different kinds of biologists have answered the question in different ways. To molecular biologists, a gene is a stretch of DNA that specifies the composition of a protein and may affect whether and at what rate that protein is synthesized, as well as sometimes affecting the syn-

thesis of proteins specified by nearby genes. To geneticists, genes are parts of our chromosomes that mediate heritable characteristics or traits. To population biologists, genes are units of difference that can be used to distinguish various members of a population from each other. To evolutionary biologists, genes are historical records of the changes organisms have undergone over time. All these definitions overlap and complement each other, and which one a particular scientist focuses on simply depends on her or his interest. (11)

In other words, the meaning of the term depends on the context of its use. But the gene as a “stretch of DNA” and the gene as a “unit of difference” (and the gene as a persuasive cultural icon, for that matter) are not simply homonyms. As Hubbard and Wald say, the definitions “overlap and complement.” They need one another. It is important to each of the disciplinary domains that the gene of the molecular biologist is understood to be, on some level, the same thing as the gene of the evolutionary biologist. But, then again, it is important that the evolutionary biologists’ definition of the gene not be constrained by the definition of the molecular biologists. As Snustad et al. put it in their college-level textbook, *Principles of Genetics*: “The definition of the gene needs to remain somewhat pliable if it is to encompass all of the different structure/function relationships that occur in different organisms” (352).

In chapter five, I consider the pliability of the term and the complementarity of definitions in terms of the theoretical concepts of boundary objects (Star and Griesemer) and epistemic things (Rheinberger). These two theoretical concepts, drawn from the fields of science studies and the history of science, help to account for the power of the gene in the social construction of scientific knowledge. Combined with focused analysis of the gene as a rhetorical figure (drawing on Jeanne Fahnestock’s analysis of figures in science), the concepts also contribute to an understanding of the rhetorical power of a scientific object in scientific and nonscientific arguments.

RHETORICAL FIGURES AND CULTURAL ICONS

Tracking the meanings of genes across disciplines, rhetorical contexts, and historic periods can be a fascinating and head-spinning adventure. It is not what this book does. A reader expecting an analysis of the relationships between meaning and context will likely be frustrated by my analysis. I am certainly not dismissing the importance of the interdependence of meaning and context, especially when it comes to scientific meaning. But the fluctuation of meanings of genes is the backdrop for this book, the backdrop that, I hope, helps to illuminate the work of rhetorical figurings. It’s not that genes are rhetorical because their meanings are contingent and context

dependent. Rather, it is because they have an uncanny ability to project a sense of being so undeniably real and so undeniably true that they appear to stand outside the influences of rhetoric, immune to the contingency of language, meaning, and interpretive context, that “genes” are worth paying attention to rhetorically.

To pay attention to genes rhetorically, I examine the figurative work that they do within particular texts. Close readings show that while the specific meanings of genes may fluctuate and be difficult to get a grip on (and may require backgrounds in molecular biology, evolution, classical genetics, and pharmaceutical research), the figurative work of genes (claiming an authoritative material reality and suggesting immunity to the contingency of language and meaning) is consistent, predictable, and consequential. Just as the biological work of genes takes place at the molecular level, not in the background of its evolutionary context, the rhetorical work of genes takes place at the textual level, not in the background of its cultural and semiotic context.

I share Carole Blair’s concern that rhetoric studies has tended to attribute the status of the real and the status of the material to a text’s context or to the setting of rhetoric, rather than to the text itself. In her essay “Contemporary U.S. Memorial Sites as Exemplars of Rhetoric’s Materiality,” Blair takes public memorials as an opportunity to create openings for rethinking rhetoric as consequential and substantial. With memorials as exemplars, Blair argues for the importance of understanding the rhetorical work of texts. Instead of stopping at the plane of symbolism and meaning, she demonstrates the importance of asking what texts *do* and how they *act*. Blair argues that contemporary rhetoric studies has been hindered by the dominance of what she calls the “language of symbolicity.” While understanding texts as symbolic and meaningful is a major component of rhetoric studies, limiting rhetoricity to symbolicity amounts to shortchanging the potential of rhetoric studies. As Blair puts it:

There are some things that rhetoric’s symbolicity simply cannot account for. One is its consequence. Even if we were to accomplish the impossible and catalogue the range of meanings referenced by a symbolic formulation, we would not therefore be in any better position than when we began to account for its consequence in use. And if rhetoric is, as I have suggested, defined in part by its potential for consequence, then there is a problem in understanding rhetoric as essentially symbolic. (19)

I am influenced by Blair’s initiative of turning to the text itself as rhetorical (i.e., substantial, consequential, meaningful, and partisan) in examining the gene as a rhetorical object. The symbolic vitality of the gene is the starting point, or the impetus, for examining the gene as itself rhetorical. Like Blair’s memorials, genes offer openings for rethinking rhetoric. A significant chunk of the “range of meanings” has been “catalogued” by geneticists, his-

torians, rhetorical critics, and scholars in science studies and cultural studies.¹ But, as Blair suggests, the catalogue of meaning is not an account of the consequences of its use. Still, understanding how the gene figure can traverse such a broad range of meaning while preserving its potential for asserting authoritative claims can lead to an understanding of how scientific objects function rhetorically.

This study, examining genes as opportunities for rethinking rhetoric, can be seen as complementing semiotic studies of genes that have been produced by scholars in science studies, gender studies, and history, as well as in rhetoric since the early 1990s.² I alluded to that complementarity earlier, when describing a commercial skit in terms of DNA as a cultural icon and in terms of the rhetorical work of DNA in staking out a claim on an authoritative reality as an antithesis to the contingencies of rhetoric. Because it lays the groundwork for rhetorical readings of genes in both popular and scientific contexts, it is worth recounting the details of Nelkin and Lindee's landmark study, *The DNA Mystique: The Gene as a Cultural Icon*. I consider it here, both for citing the insights that the study provides and for identifying where my own study of the rhetoric of genes branches off from a study of the meanings of genes.

In their 1995 study (reissued in 2004), Nelkin and Lindee analyze the powerful symbolic life of "genes" in contemporary culture, characterizing that symbolic power as the "DNA mystique" and the "gene as a cultural icon." Their study, examining DNA and genes in the texts of popular culture (including advertisements, cartoons, novels, and films, as well as news and public controversies), shows quite emphatically that genetic representations owe their symbolic vitality and cultural significance as much to the narratives, cultural tensions, and social values with which they converse as to the material qualities and biological significance of DNA. For Nelkin and Lindee, DNA "has become 'an object to think with,' a malleable idea by means of which different interpretive communities can express diverse, even contradictory concerns." Further, the gene is a powerful and convenient trope:

The gene is . . . a symbol, a metaphor; a convenient way to define personhood, identity, and relationships in socially meaningful ways. The gene is used, of course, to explain health and disease. But it is also a way to talk about guilt and responsibility, power and privilege, intellectual or emotional status. It has become a supergene, used to judge the morality or rightness of social systems and to explore the forces that will shape the human future. (16)

Nelkin and Lindee's study, initiated in the early 1990s, was both situated in and at least partially motivated by a growing wariness of genetic essentialism and an increasing concern about the allure of deterministic and essentializing arguments in popular culture. They note that the appeal of genetic

essentialism in American society “reflects the close relationships between prevailing theories of nature and cultural conceptions of social order. Perceptions of the natural order have often reproduced, and then justified, social arrangements” and the “status of the gene—as a deterministic agent, a blueprint, a basis for social relations, and a source of good and evil—promises a reassuring certainty, order, predictability, and control” (199–200).

Nelkin and Lindee do not disregard authoritative definitions of genes (i.e., those that are officiated and controlled within scientific discourse communities), nor do they dismiss the biological (and economic) significance of the material functions of DNA. But, to Nelkin and Lindee, neither the scientific meaning nor the biological functions of genes determines the symbolic meaning of genes in popular culture.³ The cultural meanings, within this perspective, can be examined separately from the scientific meanings.

Like Nelkin and Lindee, I am intrigued by the persuasiveness and cultural power of genes. I agree that the iconicity of the gene is not only an interesting cultural phenomenon but ought to stand as an open invitation for critical reading. But the “gene” is an authoritative figure, both within science and within popular culture, that resists critical readings of its meanings and can lend a sense of authority and significance to the arguments in which it appears. Though the meanings of genes change dramatically from context to context, the potential for the rhetorical work of genes is much more consistent across contexts. Thus, with an appreciation for the catalogue of range of meanings that Nelkin and Lindee have established, and with a shared concern for the persuasive powers of gene talk, I turn in this book to reconnect the iconic gene with the scientific gene.

Rather than separating meanings in scientific and popular contexts, I follow the rhetorical work of the gene across rhetorical contexts, from its inception in an argument about language and knowledge, through scientific arguments, and to its work in the contemporary popular press. The word “gene” was first introduced by Danish scientist, Wilhelm Johannsen. He introduced the term in a 1906 textbook as part of a new set of terminology designed to clarify the study of heredity in plants and animals. In 1909, he prepared a speech for the American Society of Naturalists in which he made an extended argument for the gene and the related terms. The speech, ostensibly a case for Johannsen’s “genotype” conception of heredity, can also be read as an extended argument about the problems of language, figurative speech, and the control of knowledge.

It is in the context of Johannsen’s speech that we can see that the gene was, first and foremost, a rhetorical invention, designed to lay claim to a material reality (without actually specifying that reality) and to dissociate that material reality from the problems of language, conjecture, and rhetorical uncertainty. Though he introduces genes to be treated as units of material reality, Johannsen emphatically avoids defining or positing any particular

attributes of their materiality. In fact, the closest thing to a definition of genes in Johannsen's text is an assertion of their reality and an admonition of any premature attempts to hypothesize about their physical nature. Johannsen prescribed for the gene the task of figuring a material reality immune to the uncertainties of language and rhetoric; it is this prescribed function that I trace in the book as the gene's rhetorical work.

The gene then becomes an "object to think with" for rhetoric studies, for examining persuasive scientific objects as not only meaningful but also as themselves rhetorical. Genes are rhetorical not only because they are meaningful and not only because they are invoked in arguments, but because they were designed to function rhetorically in a very particular way—a particular way in relation to categories of certainty, reality, contingency, and rhetoricity. The gene as a rhetorical object has consequences for how we understand the relationship between rhetoric and reality. That is, the gene, at work in specific texts and specific arguments, has consequences for the way rhetoric and reality are configured in relation to one another. As an object to think with for rhetoric studies, the work of the gene can show us that the boundary between rhetoric and reality is always up for rhetorical negotiation.

DOES THE GENE REALLY HAVE A GROOVE?

I have a weakness for cutesy playful titles, especially those that do the figurative work of epitomizing an argument. The title of this book is no exception. It's a bit cutesy. And a bit playful. And, it epitomizes an argument—an argument about the figurative relationships among the materiality of genes, the complex history of the gene as a scientific object, and the gene as an authoritative scientific and cultural icon. And an argument about the importance of paying attention to the play of language, especially in relation to scientific objects.

The title changed its meaning while I was preparing the book. Early on, intrigued by the persuasiveness of the gene as a cultural icon and astounded by the complexity surrounding the simple question "what is a gene?," I became attached to "How the Gene Got Its Groove" as a title figure. I had a hard time resisting an alliteration of 'g's that could join the scientific seriousness of the gene with the somewhat campy, pop-culture sense of a "groove." But, it wasn't long before I discovered that I had stumbled onto a pun. It turns out that there are physical grooves associated with genes. The structure of the double helix has two grooves spiraling around the outside of the DNA molecule: the major groove and the minor groove. It is in the grooves that proteins interact with the base pairs of DNA and effectively pick up the genetic information of genes, translating that information into protein action. So, the groove is a name for part of the shape of the molecule, a part of the shape that has consequences for understanding the biological work of DNA.

The groove of the double helix is not quite the kind of *groove* I was thinking about when I got seduced by the question of how the gene got its groove. But as a distinct physical characteristic of DNA, it provides a delightfully serendipitous pun. It is a pun with a purpose, a purpose relating to the role of rhetorical figuration in scientific realism.

Kenneth Burke described scientific realism in terms of the figurative work of metonymy. “The basis ‘strategy’ in metonymy,” he explains, is “to convey some incorporeal or intangible state in terms of the corporeal or tangible . . . ‘Metonymy’ is a device of ‘poetic realism’—but its partner, ‘reduction,’ is a device of ‘scientific realism’” (506). Poetic realism relies on metonymy as an “idiom of expression,” or as a figure that calls attention to itself as a figure and is to be taken figuratively. In contrast, scientific realism relies on metonymy as a “substantial reduction,” or a figure that is not to be recognized as a figure and is to be taken literally.

If there is ever a trope that works primarily to call attention to rhetorical play, it is a pun. Puns are often the most embarrassing of the tropes because they do not seem to have any communicative purpose; they have no capacity to convey the substance of a matter. Puns are a far cry from the master tropes that can slip unnoticed between the realm of the overtly figurative to the realm of the literal or realistic.

The pun of the groove is intended to be cutesy (and maybe a bit embarrassing) but is also intended to call attention to the figurative play of scientific objects. The groove of the gene—that is, the persuasiveness of the gene as a scientific figure and as a cultural icon—is not unrelated to the groove of DNA—that is, the functional structure of the double helix. But the link between the two can not be explained in terms of a simple metonymic or causal relationship. The link is tangled up in figurations, narratives, and arguments. Thus, I hope that the bad pun of the title can serve to make us a little bit uncomfortable (in the ways that puns do) when we start feeling the pull of attributing the groove of the gene to the material structure of DNA.

OVERVIEW OF CHAPTERS

CHAPTER TWO. GENETIC ORIGIN STORIES

Many rhetorical studies of scientific texts begin with a historical context to make a case for the scientific and rhetorical significance of the texts (see, for example, Halloran and Bradford 1984, Gross 1990, Selzer 1993, Ceccarelli 2001). But because the naming of the gene is not often treated as a conceptual breakthrough in the history of genetics and because the text in which Johannsen names the gene upholds a historical view that diminishes the scientific and rhetorical significance of the naming, I begin by troubling the relationship between the origin of the gene and the commonly told origin

narrative of genetics. Gregor Mendel is often cited as a founder of genetics and is sometimes cited as an originator of the concept of the gene. Indeed, Johannsen calls upon “Mendelism” as an argument for asserting the reality of his “gene.” In this chapter I review Mendel’s nineteenth-century work in light of the twentieth-century concept of the gene, which is often projected back onto it, and examine the making of the origin narrative that figures Mendel as the founder of genetics. Thus, rather than providing a context that illuminates the historical significance of the gene, I examine the history of the genetic origin narrative for insight into the gene’s resistance to history.

CHAPTER THREE. PRESCRIBING RHETORICAL WORK: GENETIC THEORIES, GEMMULES, AND GENES

This chapter presents the analysis of Johannsen’s address to the American Society of Naturalists in which he makes an extended argument for his specialized vocabulary, figures the gene as a material thing, and prescribes the rhetorical work for the gene. In the address, Johannsen makes a case for separating scientific language from everyday language, managing the precision of specialized terminology, and protecting scientific language from the rhetorical contaminations of figurative language, dialectical reasoning, fiction, pretending, and speculations taken as fact. Johannsen’s articulation of the gene and the genotype theory is as much about controlling rhetoric as it is about shaping genetic theories.

To illuminate the rhetorical work that Johannsen prescribed for the gene, I also examine Charles Darwin’s argument for his hypothesis of pangenesis. Darwin, in presenting his hypothesis, introduces his notion of “gemmules,” which in contrast to Johannsen’s genes are overtly hypothetical and rhetorical. As an instance of scientific rhetoric that emphasizes its own status as hypothetical and figures a conceptual unit as primarily rhetorical, Darwin’s pangenesis argument offers an illustrative point of contrast for seeing the rhetorical work of Johannsen’s gene.

CHAPTER FOUR. GENES ON MAIN STREET

This chapter takes its name from the title of an article published in *Time* in 1934. The article quotes Dr. Calvin Blackman Bridges as saying that genes would soon be “as easily located as the houses on Main Street.” Though geneticists’ perspectives on what a gene actually was (and perspectives on whether what a gene actually was even mattered) varied considerably, American popular-press articles of the 1930s and 1940s indicate that the “gene” was becoming part of an everyday vocabulary, often serving as a name for a scientific object that was on the verge of becoming a material reality. This chapter provides a brief overview of pre-1950s geneticists’ views on genes and then analyzes the rhetorical work of “genes” in magazine texts. The analysis

focuses primarily on two magazine articles published during the cold war period. The articles contrast breakthroughs in American genetics research with reports of “propaganda” regarding Soviet science, Soviet agriculture, and T. D. Lysenko’s denunciation of the gene concept. The articles are brief and rely on the gene figured as a material fact to assert an antithesis between Western society, grounded in the ethos of scientific rationality (with genes as foundational elements), and communism, grounded instead in propaganda and unreliable rhetoric (with genes declared to be “figments” of capitalist imaginations).

With an understanding of the uncertainty and controversy surrounding the material reality of genes within the scientific community at the time, popular press claims of genes on the verge of discovery and on the verge of visibility (with the assistance of electron micrographs) seem, at best, outlandishly oversimplified and, at worst, irresponsible science reporting. But the “genes” in the popular press are also doing the work that was originally prescribed for the figure of the gene. That is, they are functioning as material facts and asserting a boundary between genetic reality and problematic unreliable rhetoric. Emphasizing the rhetorical work of genes in a rhetorical context removed from a specialized scientific discourse community, the chapter suggests that although the *meanings* of the gene in popular discourse may be removed from the *meanings* of the gene in scientific discourse, the *rhetorical work* of the gene figure is consistent across popular and scientific contexts. Further, this chapter suggests that understanding the work of genes as rhetorical figures contributes to an understanding of the cultural work of genes as authoritative figures.

CHAPTER FIVE. GENES, FIGURES, THINGS, OBJECTS

This chapter draws on theories of rhetorical figures in science, boundary objects in the social production of knowledge, and epistemic things in the history of science in order to theorize the gene as a rhetorical object. The theoretical perspectives from rhetoric studies, social studies of science, and the history of science help to illuminate the knowledge-making significance of the gene as a figure within “social ecologies of knowledge” and provide a framework for examining the rhetorical work of a scientific object as it moves across texts and contexts. The chapter includes a reading of the rhetorical function of “genes” within James Watson and Francis Crick’s famous papers identifying the molecular structure of DNA. These papers are landmark texts in the mid-century transformation of the gene as a scientific object. By calling attention to the rhetorical work of the “gene” in such landmark texts, the analysis shows the inseparability of the rhetorical and epistemic functions of genes.

With the previous chapters focusing on figurings of the gene and in preparation for examining the figurative work of genes in the chapters that

follow, this chapter addresses the difficulty of answering the question of what a literal gene really is. Though the discovery of the structure of DNA solved many questions about how genes work to reproduce themselves, it also opened up many more questions about the nature and function of genes. Today, specific definitions of genes depend on disciplinary and discursive contexts. In other words, there is no singular definition of the “gene” that stands still as a literal counterpart to the figurative genes of popular culture. As an alternative to looking for a literal gene, and rather than trusting that literal genes exist elsewhere, I turn to theories of “boundary objects” and “epistemic things” which provide a handle for accounting for the extraordinary power of genes as both scientific things and rhetorical things.

CHAPTER SIX. FIGURATIVELY SPEAKING:
GENES, SEXUALITY, AND THE AUTHORITY OF SCIENCE

This chapter examines examples of “gay genes” in the popular press and peer-reviewed scientific texts from the 1990s. In the chapter, I bracket questions of the reality or scientific legitimacy of these popular and politically contentious genes. Instead I examine how the genes, or rather the “genes” (as they are most commonly introduced with scare quotes), are figured within the texts and how they in turn work to figure the authority of scientific and deterministic discourse. I pay close attention in this chapter to boundaries of literalism and figurative play. That is, I examine how such boundaries are assumed and asserted, how the boundaries figure “genes,” and, just as important, how genes work in the text to figure the boundaries.

The bracketing of the question of the legitimacy and/or reality of particular genes is important to the work of this chapter. For, to evaluate these genes on whether or not they are real or stand up to scientific standards is to miss the persuasive rhetorical and cultural work that they do. And, again, the work that they do in straddling a boundary of literal and figurative discourse resonates with the rhetorical work that the gene was originally designed to do.

CHAPTER SIX. GENOME: THE SECRET OF
HOW TROPES WORK IN THE LIFE SCIENCES

This chapter analyzes a museum exhibit, “Genome: The Secret of How Life Works,” that has been traveling to cities in the United States since 2003. The exhibit is a celebration of the science of genetics. It stages basic lessons of biology and genetics in an interactive atmosphere in which visitors are invited to engage with material forms of the metaphors and figures of the genome (e.g., the “book of life,” the cell as a manufacturing center, the “secret” of life). By inviting visitors to play with the figures, the exhibit offers a kind of training in the importance of stylistic devices in science. But it also imposes guidelines and displays the limits of rhetorical play. Analyzing the

figurative play and the boundaries of figurative play, this chapter extends the discussion of genes and the rhetorical work of genes in maintaining rhetorical boundaries.

The exhibition is actually divided into two parts: one that showcases metaphors and figurative play and one that showcases the benefits of genetic engineering and the promise of genomic research for medicine and pharmaceutical development. These two parts occupy two separate spaces that are joined by a passageway labeled "Living on the Frontier." In passing from the figurative play room to the "frontier," visitors leave behind the playful metaphors and stylistic devices and enter a zone of literalism where scientific realism is asserted both implicitly and explicitly.

I conclude the book at the constructed boundary of the genomic frontier. This constructed boundary, separating two parts of an exhibition on the genome, one part openly figurative the other appealing to literalism, offers a figure for the study of the rhetoric of science. That is, to address the authoritative claims of rhetoric in science and rhetoric about science, it is not enough to identify and analyze figurative devices; we also need to stay tuned to the boundary asserted between, on the one side, the figurative and the rhetorical and, on the other side, the literal and the real.