Introduction: The Gospel of Germs

In 1989, a woman wrote the columnist Ann Landers asking for advice. Her fiancé had insisted on inviting a friend who had AIDS to their wedding, and even though she knew none of her guests could catch the virus simply by being in the same room with him, still, she worried, “What if someone should accidentally use R's fork, or drink out of the same glass? What if he should sneeze across the table or, heaven forbid, give me a kiss of congratulations?” The bride-to-be was nervous that if news leaked out that a person with AIDS was attending her wedding, other guests would be afraid to attend.

Like many public health authorities confronted with popular anxieties about HIV, Ann Landers showed no patience with the woman’s confusion; she responded testily, “You need to educate yourself.” Landers was quite right, of course; HIV is not spread by what public health authorities call “casual” infection, that is, nonintimate contact between the sick and the well. But despite repeated assurances from experts, many Americans continue to worry that any exposure to people with AIDS, or even to the objects they touch, could infect them with the disease. For those who carry the virus, this unshakable faith in the dangers of casual infection has caused untold misery and cruelty.

With no intention of excusing that cruelty, this book nonetheless attempts to understand the fears that have possessed so many Americans in the face of the AIDS epidemic. Although homophobia and racism have played a huge role in their genesis, there is more to those fears than simply ignorance, irrationality, or prejudice. They stem
from fundamental beliefs about contagion and its association with certain behaviors and objects—attitudes that even the most enlightened and humane individuals share. People with AIDS and those who love and care for them also experience the dread that seemingly insignificant forms of contact will spread the disease. This book examines how and why that collective sense of apprehension came to be.2

When Ann Landers’s bride-to-be expressed anxiety about forks and cups and kisses, she unwittingly gave testimony to what I term the “gospel of germs,” that is, the belief that microbes cause disease and can be avoided by certain protective behaviors. Today, we recognize that a wide variety of organisms, referred to colloquially as “germs,” are capable of causing disease; they include bacteria, viruses, rickettsiae, parasites, and fungi. Beliefs concerning the existence of germs are among the most widely shared scientific precepts governing everyday life in modern Western societies. Although some may still disagree about the link between a specific microbe and a particular ailment, the general principle that pathogenic microorganisms can cause sickness is rarely disputed. Like the law of gravity or the solar-centered planetary system, the so-called germ theory of disease has the aura of a timeless and universal truth.

As a result, we are taught from a very young age to believe in disease agents that we cannot discern with our own senses and to shun certain contacts with other people—including their sneezes, coughs, and feces—as a way to avoid encountering germs. Parents, teachers, health care professionals, and advertisers all continually reinforce the association between practices such as hand washing or refrigerating food and the preservation of health. The rituals of germ avoidance are so many and so axiomatic that we scarcely can remember when or where we first learned them.3

Yet far from being timeless or universal, our beliefs and fears about germs are a relatively recent acquisition. Only a century ago, our grandparents and great-grandparents had no idea that the agents of infectious diseases were microorganisms. The reality that we now take for granted—that we share our bodies and homes, our air and food, with a multiplicity of microorganisms, some of which are quite dangerous—they had to be carefully taught. How Americans came to believe in the existence of germs, and how that understanding changed their lives, is the subject of this book.

We can best appreciate the magnitude of this transformation by contemplating the way that ordinary Americans conceived of disease prior to the late 1800s. Long before the germ theory had gained wide acceptance, Americans were aware that people suffering from certain diseases, such as smallpox or bubonic plague, gave off some sort of intangible substance capable of making others sick. Common wisdom held that the sick person’s breath, skin, evacuations, and clothing could all harbor the “seeds” of disease and spread them to those who were well. But the nature of this infective substance remained mysterious. The fact that many diseases spread without any known contact with the ill led many physicians to suspect a more generalized, atmospheric source of infection. This suspicion was often referred to as the “miasma” theory.4

Although they avoided those who were ill from smallpox or cholera, most nineteenth-century Americans showed little concern about those forms of casual contact with other people, or contamination of water and food, that are today shunned in the name of health. They shared beds, at home with relatives or in hotels with strangers, without inquiring deeply about their bed partner’s health. They exchanged combs, hairbrushes, and even toothbrushes, and fed babies from their mouths and spoons, with no sense of hazard. They coughed, sneezed, and spit with blithe disregard for the health consequences to those around them. They stored and cooked their meals with scant concern for foodborne illness. They drank unfiltered water from wells and streams, often using a common dipper or drinking cup. Last but not least, they urinated and defecated in chamber pots and outdoor privies with little regard for where the contents ended up in relation to the community water supply.5

To be sure, some Americans began to shun these promiscuous minglings with other people’s bodies long before the germ theory of disease was introduced, but they did so for reasons other than avoiding disease. Ever since the Renaissance period, etiquette books had counseled personal cleanliness and had prohibited behaviors such as spitting and coughing among those seeking social distinction. In the eighteenth century, educated and genteel Americans began to cultivate habits of cleanliness to enhance their well-being and to project a pleasant social persona. The pursuit of gentility and politeness, not the fear of disease, fueled a revolution in cleanliness that began among the colonial elite and gradually spread to the urban middle classes.6
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Still, for all their growing dedication to soap and water, few Americans prior to the Civil War worried about the daily hazards of infection except during times of epidemic. This lack of concern reflected in part how relatively few illnesses physicians and lay persons classified as "catching" prior to the mid-1800s. Many common diseases that we now know to be communicable were thought to be constitutional in origin, that is, the result of poor heredity complicated by unhealthy living habits. Consumption is a case in point. The disease we now recognize as tuberculosis was endemic during the first two-thirds of the nineteenth century; it caused perhaps as many as one in four deaths and took a particularly heavy toll among young adults. Until the 1880s, consumption was widely attributed to an inherited weakness of the lungs, which could be aggravated by overwork, a damp climate, a neglected cold, or overindulgence in alcohol. Those who suffered from the disease had no conception that the droplets they expelled when spitting or coughing carried the bacteria responsible for the disease. 

In retrospect, Americans' lack of awareness about the potential deadliness of their secretions is chilling. In his biography, the physician Edward Trudeau, who later became one of the first American converts to the germ theory of tuberculosis, recalled nursing his consumptive older brother through his final illness in the 1860s. For weeks he tended his brother in a hot, close room, sleeping beside him at night to be close at hand, unaware of the risk to himself. The brother's physician instructed Trudeau to keep the windows tightly shut, a recommendation that only increased his likelihood of infection. Within a few years of his brother's death, Trudeau too developed tuberculosis. Not until 1882, when he read of Robert Koch's discovery of the tubercle bacillus, did Trudeau realize that he had most likely contracted the disease by being such a faithful nurse to his dying brother.

Food handling provides another telling example of how different hygiene standards were before people became schooled in the germ theory. Food producers and consumers alike routinely handled food in ways guaranteed to ensure frequent microbial contamination. Milk was left exposed to air and flies, perishables were stored at uneven temperatures, and cooked food was left on the table between meals. With no knowledge of the healthy carrier concept, seemingly robust cooks and waiters passed on the microorganisms of typhoid and other ailments to those they served.

Given how hard it is to prevent food poisoning even today, we can hardly begin to imagine how frequently Americans suffered from foodborne disease in the nineteenth century. To give but one hair-raising example: in 1891, over sixty people attending a wedding in Lyndon, Kentucky, succumbed to a violent gastrointestinal illness. Six people died, including the bridegroom. Suspicious that a spurned admirer of the bride had poisoned the guests with arsenic led to a full-scale medical investigation. The culprit turned out to be the chicken salad, which had been made from meat cooked two days before the wedding and stored in broth at room temperature.

This innocence, or lack of awareness, regarding practices that we know now can spread deadly disease characterized many aspects of daily life prior to the mid-1800s. In those days, Americans neither thought of casual contact or food contamination as an omnipresent source of infection nor assumed that safety from contagion required constant, unremitting discipline of their bodies and households. In the absence of that awareness, death rates from infectious diseases such as typhoid and tuberculosis rose precipitously as more and more people moved to cities, lived in closer proximity to one another, and depended upon common supplies of water and food.

The growing threat of mysterious fevers and wasting diseases left no class or ethnic group unscathed. Even the most powerful and respected figures in Anglo-American society knew the humbling experience of deathbed scenes. For example, typhoid fever robbed a war-weary President Lincoln and his wife of their adored son Willie; left Queen Victoria grief-stricken over the death of her husband and the near-death of her eldest son; and smote the mother of a future president, Theodore Roosevelt, the same day that his wife died in childbirth. Although then as now the poor suffered more, wealth and social status offered no protection against what contemporaries often referred to as the "invisible enemies" of disease.

In this climate of loss and anxiety, the germ theory of disease began to attract popular interest even before physicians agreed that it was valid. The idea that living organisms had a role in causing disease had a long and venerable history dating back to classical times, but as of the mid-1800s, what was sometimes referred to as the "animaculous hypothesis" was distinctly unpopular among medical men, as I will discuss in Chapter 1. During the 1860s and 1870s, however, experimentalists such as the French chemist Louis Pasteur...
and the German physician Robert Koch compiled increasingly convincing proof that distinctive species of microbes were linked with the most deadly diseases of the era. Starting in the late 1870s, the new scientific discipline of bacteriology scored a succession of dramatic discoveries by rapidly identifying the bacteria responsible for cholera, tuberculosis, gonorrhea, typhoid, and scarlet fever. Although many physicians continued to have reservations about the germ theory of disease, the general principle that microorganisms played a central role in causing communicable diseases had by 1900 achieved widespread acceptance in both Europe and America.

Initially bacteriologists had high hopes that their new understanding of disease would yield effective cures and preventive vaccines. But although a few useful measures were discovered—the diphtheria antitoxin and a vaccine for rabies in the 1890s, the arsenical-derivative Salvarsan for syphilis and a vaccination for typhoid in the early 1900s—hopes for reliable chemotherapies were not realized until the 1930s and the 1940s, when sulfa compounds, penicillin, and other antimicrobial drugs were discovered.

For the first fifty years after its acceptance, the germ theory provided its greatest utility as a guide to the prevention of disease through modification of individual and collective behavior. Bacteriologists not only identified the specific agents of infection, but also tracked how they spread from the sick to the well. With an increasingly detailed and accurate road map of the circulation of germs, they could better direct public health efforts to interrupt the way the organisms were spread. Gradually, older theories of atmospheric infection gave way to a more modern understanding of how diseases are transmitted by casual contact, food and water contamination, insect vectors, and healthy human carriers.

These revelations prompted a radical expansion of collective public health practices, including municipal sewage systems, water purification, garbage collection, and food inspection. Our modern conceptions of governmental responsibility for public health date from this period, 1890 to 1930, which is often referred to as the "golden era" of the American public health movement. These same years also represented a period of intense interest in what I think of as the "private side of public health," that is, the reformation of individual and household hygiene. Between the 1880s and the 1920s, Americans of all ages were subjected to aggressive public health campaigns that taught them the new lessons of the laboratory: that microscopic living particles were the agents of contagion, that sick bodies shed germs into the environment, and that disease spread by seemingly innocuous behaviors such as coughing, sneezing and spitting, sharing common drinking cups, or failing to wash hands before eating.

In retrospect, the task of convincing ordinary Americans that they coexisted with an invisible world of microorganisms—like "Gulliver among the Lilliputians," as one commentator termed it—appears daunting. Germs could not be seen, smelled, or touched. Confirming their existence required gazin down the lens of a microscope, a privilege that many Americans a century ago never enjoyed. The first apostles of the germ faced a considerable challenge in convincing their contemporaries that such an intangible being as a germ existed, much less that it caused potentially deadly illnesses.\(^{12}\)

At the same time, this leap of faith was perhaps less extreme than it might at first appear. By virtue of their religious heritage, ordinary Americans had been conditioned to believe in an "invisible world" dominated by unseen forces that held the power of life and death; as public health reformers often noted, there were striking similarities between traditional fears of malignant spirits and the new views of the germ. In addition, rational or naturalistic explanations for epidemic disease had long assumed the reality of intangible disease agents borne in the unseen miasma or the sick person's breath. What science had done, apostles of the germ argued, was to demonstrate the "true" identity of these invisible, malignant agents and to show that they were part of a natural order and thus controllable by human action. Thanks to bacteriology, T. Mitchell Prudden, one of the first Americans trained in the new experimental methods, asserted in 1890, "We no longer grope after some mysterious, intangible thing, before which we must bow down or burn something, as if it were some demon which we would exorcise."\(^{13}\)

The identification of dread disease with a concrete enemy piqued popular interest in the germ theory from its earliest days. As one commentator observed in Popular Science Monthly in 1885, "The germ theory appeals to the average mind: it is something tangible; it may be hunted down, captured, colored, and looked at through a microscope, and then in all its varieties, it can be held directly responsible for so much damage." At the same time, the tones of awe and appre-
hension so frequently apparent in early accounts of the microbial world suggest the lingering influence of religious and magical views of disease. It is no wonder, then, that when the science fiction writer H. G. Wells needed to rescue humankind from an invasion of Martians in his celebrated 1898 short story “The War of the Worlds,” he turned to bacteria as the most powerful deus ex machina at his fictional command.14

For all its novelty, however, the new germ theory of disease did not immediately displace established ways of thinking about and warding off contagion. Just as people today respond to the AIDS epidemic in terms of current understandings of infection, Americans a century ago tried to incorporate the microbe into old and familiar explanations for disease. In particular, initial understandings of the germ theory were deeply indebted to an older scientific discipline known as “sanitary science,” which stressed the ubiquity of airborne infection and the disease-causing properties of human wastes and organic decay.

The first three chapters of The Gospel of Germs explore the marriage of sanitary science and germ theory, which shaped the first generations of preventive lessons aimed against the microbe and taught in the 1880s and 1890s. The initial understanding of germ diseases reflected sanitary beliefs in the existence of what were termed “house diseases,” that is, illnesses caused by defective plumbing, ventilation, and housekeeping. As a result, Americans first understood the chief menace of microbes to arise from their toilets and washbasins, which they feared as portals for dangerous bacteria-laden “sewer gas” to enter their homes. This fear led to an obsessive concern with domestic plumbing and ventilation.15

With the maturation of bacteriology in the 1890s and early 1900s, there came a second, more expansive version of the gospel of germs, described in Chapter 4. The recognition that consumptives’ coughs and sneezes contained the tubercle bacillus intensified attention to the infective discharges of the mouth and nose. Correspondingly, turn-of-the-century preventive education focused increasingly on the exchange of germs through unguarded coughing and sneezing, shared drinking cups, and other common practices that facilitated the transfer of saliva. But the new anxieties about infection via casual contact by no means eclipsed the older focus on “house diseases.” For example, bacteriologists found that they could culture the tubercle bacillus from common house dust; thus ridding the home of that dust became a fundamental tenet of tuberculosis prevention. (Only later did further investigations reveal that the germs cultured from dust had little infective power.) Theories of “fomite infection,” which held that objects could harbor the dried microbes of disease for months and even years, heightened concerns about household furnishings and clothing. Evidence that houseflying carried the tubercle bacillus and other germ diseases on their feet led to crusades to get window screens in every home. As a result, the house disease concept remained an integral part of the turn-of-the-century gospel of germs.

Bacteriologists’ fine-tuning of the preventive lessons of everyday life coincided with the mass dissemination of the gospel of germs during the Progressive period. During the 1880s and 1890s, avoiding germs had been primarily the obsession of prosperous urban families. In the early 1900s, however, reformers sought to bring hygienic enlightenment to all Americans, in order to emancipate the whole society from the fear of infectious diseases. To that end, the gospel of germs was taken up by an impressive array of Progressive-era institutions, including municipal and state health departments, life insurance companies, women’s clubs, settlement houses, Boy Scouts and Girl Scouts, YMCAs and YWCAs, labor unions, and agricultural extension programs.

In Chapters 5 and 6, I look at two of the most influential conduits of popular germ-consciousness in the early 1900s, the antituberculosis crusade and the domestic science movement. To get across the message that T.B. was a communicable disease, the antituberculosis movement pioneered methods of health education that were copied widely by other public health workers and that with surprisingly little modification remain in use today. Borrowing overtly and enthusiastically from the new advertising culture of the early 1900s, antituberculosis workers turned out posters, slogans, and other forms of propaganda to “sell” their message of protection against the ubiquitous tubercle bacillus. The domestic science movement, which originated at about the same time as did the antituberculosis crusade, focused more specifically on educating housewives and mothers about germ life in order to make the American home more healthy and productive. During the early twentieth century, an army of new female professionals, including home economists, visiting nurses,
and social workers, dedicated themselves to bringing the insights of “household bacteriology” to every homemaker in the nation.

Although it was portrayed as a set of obligations that both sexes had to honor, the kind of cleanliness required by the gospel of germs clearly had more profound implications for women, both as private citizens and as professionals. Men certainly had their roles to play under the new germ credo, but on a day-to-day basis the bulk of the worry and work fell on women, most of whom were housewives. The gospel of germs turned even humble chores such as dish washing and sweeping into “a fine action, a sort of religion, a step in the conquering of evil, for dirt is sin,” to quote the pioneer home economist Ellen Richards. The association between house diseases and housekeeping simultaneously ennobled women’s work in the home and made it more physically and emotionally burdensome.16

The third section of the book looks more closely at how different groups of Americans began to understand and act upon the gospel of germs. In Chapter 7, I survey the extraordinary range of behaviors that affluent Americans changed between the 1890s and the 1920s in order to evade the germ. Men shaved their beards and women shortened their skirts to eliminate potentially germ-catching appendages. They stripped their homes of allegedly microbe-laden furnishings and embraced as necessities for a germ-free life such household institutions as the white china toilet, the vacuum cleaner, and the refrigerator. They purchased, stored, and cooked their food in new ways designed to retard bacterial contamination. They learned to avoid other people’s sneezes and coughs, and to shy away from familiar social customs such as handshaking and baby kissing. This domestic revolution carried over into “homes away from home” such as hotels, railway cars, restaurants, and even funeral parlors. As more and more germ-conscious Americans dined out and traveled, the institutions that served them strove to cater to their sanitary scruples. Hotels began to supply individual cakes of soap and to use extra long sheets so that sleepers might fold them back over potentially germ-ridden blankets. Churches adopted individual communion cups, and cities installed sanitary water fountains to replace the contagion-spreading common cup.

Marketplace forces and mass advertising played a central role in fostering this more “antiseptic conscious America.” We rarely think of corporate America, particularly advertising agencies, as having much to do with the dissemination of scientific ideas. Yet as both Chapters 3 and 7 make clear, reformers and educators were not the only ones to interpret the germ theory’s relevance for the habits of everyday life. From the 1880s onward, entrepreneurs and manufacturers of all sorts realized that the fear of the microbe could be effectively exploited to sell a wealth of goods and services. Under the aegis of the first, sanitarian-dominated gospel of germs, entrepreneurs promoted safeguards against the dangers of sewer gas and polluted water, such as special toilet attachments and household water filters. In response to the second, more bacteriologically informed gospel, the range of aids to combat the microbe expanded dramatically between 1895 and 1915 to include everything from antiseptic floor coverings and wall paint to sanitary dish drainers and fly traps.

Germ-conscious advertising campaigns became an educational force, yet they did not represent a simple extension of the work of the antituberculosis crusaders or the domestic scientists. For all their invocations of laboratory authority to sell their products, manufacturers and advertisers displayed no deep allegiance to the scriptures of science. By keeping alive aspects of the gospel of germs that public health experts wished increasingly to jettison, such as the fear of sewer gas, advertising served other, more profit-oriented motives.

Although hygiene reformers and manufacturers both cast the principles of germ protection as universal goods in American society, the expense of sanitary protections placed these aids out of the reach of many Americans well into the 1930s. Working-class families could ill afford even the most basic prerequisites for practicing the gospel of germs, such as flush toilets, clean running water, and a safe milk supply. The ability to conform to “antiseptic” standards of cleanliness differentiated rich from poor, educated from unschooled, American-born from foreign-born. In Chapter 8, I look at some of the consequences of the uneven spread of sanitary boons as it affected two different groups of women on the periphery of middle-class America: immigrant housewives and farm women.

For many middle-class Americans in the early 1900s, the association of poor, immigrant, and non-white citizens with disease germs only deepened their feelings of class prejudice, nativism, and racism. By harping on the menace of contagion, the apostles of the germ inevitably increased the stigmatization of the sick and the poor. The specter of infection served nativists and racists well in their efforts to legitimate immigration restriction and racial segregation.
...the gospel of germs gave rise to other, countervailing pressures toward inclusion and reform. Many converts to the germ theory believed deeply in a "chain of disease," a "socialism of the microbe" that linked all members of American society together. If not for simple humanity, then for this reason alone, they argued, the health problems of the poor and the newcomer had to be addressed. The great disease crusades of the early twentieth century created a common set of assumptions about contagion that crossed class and race lines and became intellectual capital in movements for broad-ranging social change. Chapter 9 explores how labor unionists and African American community activists tried to turn the fear of disease into weapons to do battle for economic and social justice.

The main body of the book ends in the 1920s, when the intensity of efforts to spread the gospel of germs began to fade. With further bacteriological scrutiny, the frequency of infection by dust and fomites came into question; instead, experts placed increasing emphasis on the importance for disease control of contact infection and healthy carriers of disease. Practitioners of the so-called new public health advocated more attention to identifying and isolating the sick and distanced themselves from the expansive social concerns and evangelical fervor of their predecessors’ educational crusades.

At the same time, many of the basic tenets associated with the gospel of germs remain the foundation of public health practice to this day. The idea that germs may survive months and even years in dust and on fomites may have been discarded, but most other principles of the preventive code have been preserved. As one reads through the latest edition of the American Public Health Association’s standard handbook on the control of infectious diseases, it is evident that droplet infection via sneezing and coughs, casual contact, fecal contamination of water and food, insect vectors, and improper food handling are still recognized as the most common ways that infectious diseases spread.17

But after World War I, personal and household hygiene practices gradually came to be less essential to the control of deadly disease. The gospel of germs declined in importance, largely due to the steady decline in mortality rates from infectious diseases and a strengthening of collective protections against germs, such as water filtration and food regulation. By the late 1920s, heart disease, kidney disease, and cancer had replaced respiratory and gastrointestinal infections as the leading causes of death. Understandably then, both scientific interest and public health initiatives turned increasingly to the prevention of chronic, noninfectious ailments that now constituted the chief threat to American health. Still, as Chapter 10 makes evident, germ consciousness remained strong until the 1950s, largely due to the polio menace and the influence of advertising. Not until the widespread availability of antibacterial drugs after World War II did the gospel of germs truly fade into insignificance as a road map for avoiding deadly disease—at least until the AIDS epidemic. I suggest in the Epilogue that the gospel of germs has taken on new relevance since 1980, as Americans have been confronted with a new generation of "superbugs," chief among them the human immuno-deficiency virus.

The “triumph” of the germ theory of disease has long been a central theme in both medical and social history. Reams of paper have been devoted to the scientific antecedents and experimental discoveries that gave rise to the modern view of infection. There are many fine studies of the changing thought of individual scientists and of conceptions of specific diseases, such as cholera and tuberculosis. Historians of public health, of women, of advertising, and of architecture have all noted the fact that Americans became extraordinarily germ conscious at the turn of the century. Yet surprisingly little has been written about the collective dimensions of this great watershed in thinking about disease, and the ways in which the “lessons of the laboratory,” as I term them, became part of the fabric of everyday life.18

In tracking that collective consciousness, I have been inspired by historians of science such as John Burnham, Roger Cooter, Bruno Latour, and Martin Pernick, who have drawn new attention to the historical processes by which popular understandings of disease are constructed. Like them, I prefer to think of popularization not as a hierarchical, top-down process where the focus is on what the public gets “right” or “wrong,” but as a dynamic where ideas and images are traded among different audiences, including laboratory scientists, practicing physicians, hygiene reformers, and interested lay people. Instead of treating popular views as merely pale, distorted images of the “real” knowledge generated by “real” scientists, such a model allows for ideas to travel in more than one direction, to accommo-
date, for example, the influence of sanitary thought on early formulations of the germ theory. This approach also helps to describe what interests me most, that is, how scientific precepts become a part of the working hypotheses of everyday life, or what is sometimes termed "ethnoscience."^{19}

Although I have sought to avoid a hierarchical view of popularization, I have tried not to gloss over the simplifications and distortions that inevitably occurred as bacteriological knowledge moved from the laboratory to the parlor, so to speak. Judged as a rational process of education, there is no doubt that the great disease crusades of the early twentieth century fell short. To the extent that many public health reformers ceased trying to convey any comprehensive understanding of disease and focused only on teaching health habits, the gospel of germs became what John Burnham has termed the "functional equivalent of superstition." Shorn of its scientific underpinnings, the new germ credo all too easily turned into another form of magic to be followed blindly and mechanically. When that magic failed and illness could not be avoided, its practitioners were left with a heavy load of anxiety and pain, which easily became fodder for the sorts of irrational hatreds and prejudice directed toward consumptives a century ago, or toward AIDS patients today.^{20}

At the same time I acknowledge the dark consequences of the gospel of germs, I also tell another side of the story that has been given less attention by historians. The great disease crusades of the early twentieth century did not succeed in giving every American an accurate understanding of the germ theory of disease, yet they nonetheless did a remarkable job of inducing people from varied backgrounds to change fundamental personal behaviors. Even if practiced only as a form of health "superstition," the rules of germ avoidance still served a useful function; a family need not understand the principles of the germ theory of disease in order to abandon household practices that spread fecal contamination and thereby enjoy less risk of cholera or typhoid.

My interest in individual and household practices—that is, the habits that ordinary Americans associated with disease prevention—takes this book in directions rather different from those followed by previous historians of public health. For many years, the golden age of public health has been equated with the collective, state-legislated measures enacted at the turn of the century. The popular education campaigns of the same time have been comparatively neglected, in large part due to the assumption that what they taught did not matter very much. That dismissive view dates back to the 1910s and 1920s, when proponents of the new public health began to extol the triumph of "real" science over the "bogus" precepts of their predecessors—a view enshrined in popular works such as Sinclair Lewis's novel *Arrowsmith* and Paul de Kruif's *The Microbe Hunters*.^{21}

Until recently, historical demographers tended to reinforce the assumption that changing personal and household practices had little to do with the decline in mortality rates from infectious disease that began in the nineteenth century. Here the work of the English physician Thomas McKeown was especially influential. In the 1960s and 1970s, McKeown argued that the great mortality transition was an unintended outcome of better nutrition and higher living standards, rather than a result of the interventions of either organized medicine or the public health movement.^{22}

When I first began this book, I will admit that I too was inclined to see the personal health practices that I was tracking as having little demographic significance. But I soon came to accord my subject more respect, for two reasons. First, I was continually reminded by current events how these same practices were still promoted as fundamental forms of disease control. In the precautions urged on New Yorkers during the T.B. mini-epidemic of the early 1990s, and the rules of safe meat handling issued by the U.S. Department of Agriculture, I could see the direct descendents of the lessons in tuberculosis control and household bacteriology that I was studying.

I was also profoundly influenced by the growing interest in personal health practices shown by a new generation of historical demographers and medical historians. Scholars such as Gretchen Condron, Anne Hardy, Samuel Preston, and Simon Szreter have begun lately to suggest that voluntary changes in health behavior contributed more to the mortality decline than the so-called McKeown thesis allowed. This new work points out that death rates began to diminish decades before citywide public health works had ensured safe sewage systems, water purity, and food supplies. Had individuals and families begun to practice some of the sanitarians' recommendations, such as avoiding fecal contamination, boiling drinking water, and practicing isolation procedures while nursing sick relatives in the home, it is conceivable that they could have improved their families' chances of survival.^{23}
Prior to 1900, the demographic effect of such household-level changes probably remained modest, especially in reducing rates of infant and child mortality. But the work of Douglas Elway and Samuel Preston suggests that between 1900 and 1930 popular health crusades aimed at teaching principles of milk purification and childhood disease management to mothers contributed to a striking drop in death rates among the young. The demographic data, they conclude, suggest that "changing personal health practices may have been an important contributor to the decline in infant and child mortality" in both the United States and Britain.  

My study does not pretend to make any definitive contribution to this complex demographic debate. Knowing that those debates are going on, however, has strongly affirmed my conviction that the revolution in personal hygiene behavior is far more worthy of serious analysis than the work of Lewis and de Kruif allowed. This conviction has been further strengthened by my appreciation of the gendered dimensions of this revolution. As the new demographic work suggests, much of the germ theory's relevance for personal health practices fell in the realm of housecleaning, childcare, and food preparation, domains traditionally designated women's work and consequently ignored or trivialized. One of my goals in writing this book has been to challenge the implicitly gendered division of knowledge that regards as significant what Pasteur did in the laboratory but dismisses as inconsequential what a public health nurse or housewife did with his insights.  

Taking personal hygiene behaviors seriously as forms of disease prevention inevitably puts my interpretation at odds with another long scholarly tradition, that of analyzing germ fears primarily as cultural artifacts. In their influential accounts of cleanliness behaviors, the German sociologist Norbert Elias and the English anthropologist Mary Douglas formulated a position that many scholars have followed ever since: that the apprehensions about disease expressed in the pursuit of cleanliness are a mere rationalization for, in Douglas's words, "gestures of separation and classification" that serve other, more powerful needs to create and maintain social order. As Douglas put it in her 1966 classic Purity and Danger, "In chasing dirt, in papering, decorating, tidying we are not governed by anxiety to escape disease, but are positively re-ordering our environment, making it conform to an idea."

This perspective has led to a much needed appreciation of the cultural dimensions of cleanliness and has certainly shaped my own understanding of the gospel of germs. I agree with the premise that no disease is ever observed in a totally unbiased way; there is always a scrim of culture affecting our perceptions of and attempts to treat illness. Yet taken too far, the Douglas approach too easily discounts fear of disease as a motivation for specific cleanliness behaviors. The perspective of Purity and Danger reflects the confidence of the 1960s, the same era in which the U.S. surgeon general decreed that infectious diseases no longer constituted a serious threat to the public's health. Without denying that the cultural construction of dirt reflects more than just the fear of disease, my interpretation emphasizes how everyday encounters with illness and death reinforced the lessons of germ avoidance.

To use a modern parallel, imagine an anthropologist writing a hundred years from now about the AIDS epidemic and interpreting such preventive measures as using condoms and disinfecting needles with bleach purely as "gestures of separation and classification" aimed at homosexual men and intravenous drug users. Such a position would strike us as ludicrous. Even the most ardent proponents of the cultural construction of disease are unlikely to deny that safe sex and clean needles save lives. Dismissing late-nineteenth-century reformers' efforts to convince people to prevent fecal contamination of their water supply or to eliminate pathogenic microorganisms from their food as merely attempts to act out middle-class status anxieties or to stigmatize certain groups of Americans is equally simplminded.

My historical analysis seeks to strike a balance, then, that honors both the cultural construction of cleanliness and the biological dimension of disease. Ailments such as typhoid and tuberculosis do have a biological reality, a set of distinctive pathological features that shape the cultural meanings attached to them. Fears of their dangerousness are founded in painful experiences of illness and death that must not be overlooked. Bringing this "biological body" back into the historical narrative is essential to understanding the transformations wrought by changing disease theories a century ago.

My narrative also questions the widespread tendency to blame the acceptance of the germ theory for the limitations of the modern biomedical model of disease. The growing authority of bacteriology
as a scientific discipline is usually portrayed as a conservative development that inevitably narrowed the scope of American medicine and encouraged new forms of discrimination. The germ theory is often linked with images of inspection, exclusion, and incarceration: the Ellis Island inspectors using buttonhooks to check immigrants' eyelids for trachoma, the health officials sending poor consumptives off to the sanatorium to die, or the sad figure of Typhoid Mary banished to North Brother Island for over thirty years. 

These developments were certainly one consequence of the germ theory's acceptance, but they do not represent its sole legacy to American politics and culture. Although historians have traditionally highlighted their invocation in campaigns for immigration restriction and racial segregation, the "truths" of the germ theory were also invoked in less conservative movements for economic justice and social equality. By looking closely at these latter efforts, I want to emphasize that the discovery of the germ had no fixed moral or social message; there was nothing inherently narrow or discriminatory in the germ theory of disease itself. Its meanings for everyday life were susceptible to multiple interpretations and were deployed in competing arguments about the problems of American society. If certain views gained more influence than others, we must look to the political and cultural context of the debate, and not to the theory itself, for an explanation of that fact.

Although this study focuses only on the United States, it is important to acknowledge that similar public health crusades occurred during the same time period in other Western countries such as England and France. Through the influence of colonial rule, the gospel of germs was also exported to many non-Western nations such as China, India, and the Philippines. Any systematic comparison of these movements is beyond the scope of this already overly ambitious study. But on the basis of my limited forays into other national scenes, I would like to emphasize two aspects of the American health crusades that I believe to be distinctive.

First, I would point to the heavy influence of advertising methods and consumer-oriented approaches. Recent studies of advertising and popular culture have underlined their precocious and dominant effects on American society. My work suggests that this influence carried over into the public health movement as well. American hygiene reformers displayed a precocious interest in and talent for exploiting the new forms of mass communication and persuasion available in the early twentieth century. Conceptions of "selling" health were central to their programs of popular education. Second, I believe that crusades against disease have played a special role in American political culture. Although other nations have certainly invoked health as a common civic goal above the fray of party politics, that vision has loomed especially large in the United States. In a democratic society riven by gender, racial, ethnic, and class differences, notions of public health citizenship have offered a seemingly neutral ground for building consensus, for purposes of both exclusion and inclusion.

Although I seek to challenge some of the conventional academic wisdom about the effects of the germ theory on American medicine and popular culture, let me be the first to point out that I commit some major sins of overgeneralization of my own. It is impossible to write about the evolution of ideas about germs without imposing more order on that process than actually existed. When I interpret the meanings assigned to phrases such as "the germ theory of disease" or the "gospel of germs," I endow them with more coherence and consistency than they ever really had. Rather than place those phrases in quotation marks throughout the whole text, I warn the reader now that I use them as a form of historical shorthand to track a very untidy set of ideas.

I have tried also to avoid using terms such as "popularization," "mass education," or "the public" as if any such unitary processes or collective entities existed. In the time period of my study, the 1870s to the 1920s, Americans were, as they are now, a highly heterogenous people. Their diversity requires that we look carefully at how different groups responded to the same set of ideas. I have thus tried to balance sweeping generalizations with in-depth case studies that bring a wide range of voices into the narrative.

Likewise, I want to acknowledge the importance of individual variance. Members of the same gender, ethnic, class, or racial group may hold very different opinions on matters of health. One member of a family might be very anxious about the threat of radon gas, whereas another might dismiss it as an overblown fear. The same was undoubtedly true in the period of my study. Some individuals shrugged off the dire warnings about germ dangers, whereas others worried about them incessantly. These varying degrees of germ consciousness were
shaped by factors such as parental views about cleanliness, personal experiences with illness, and basic traits of personality that I as a historian cannot easily assess. At best what I have done here is to track a cluster of beliefs and behaviors concerning infection that were held by many, if not all, Americans in the decades between 1870 and 1930.

One final note on terminology: technically, the terms "infectious," "contagious," "communicable," and "epidemic" have different meanings when applied to disease. "Infectious" denotes a disease that may spread from person to person without actual contact between them; in contrast, a contagious disease is directly transmitted from person to person. "Communicable" is a more general term that covers both infectious and contagious diseases. Epidemic diseases spread rapidly from a few cases to a large number of people, then gradually disappear; endemic diseases exist more or less constantly in the population.

These terms had similar meanings in the late nineteenth century. In actual use, however, the distinctions are and were difficult to maintain. In the time period of my study, medical authorities frequently admitted the hopelessness of precision in the usage of these terms, especially the futility of maintaining the distinction between infectious and contagious diseases. In the Transactions of the American Medical Association for 1866, one physician expressed the general sense of frustration: "The three appellatives, Epidemic, Contagion, and Infection, not infrequently confuse the investigator, and the boundary line between them seems even more imaginary than the equator." With all due respect to the technical differences between infectious and contagious, which I know to exist, I have also chosen to "ignore the equator" and use those terms interchangeably in this book.

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The Gospel Emergent, 1870–1890