HEALTHY FEAR: BACTERIA AND CULTURE IN AMERICA AT THE TURN OF THE TWENTIETH CENTURY

by

JAMES BARLAMENT

(Under the Direction of Alexei Kojevnikov)

ABSTRACT

This thesis explores the intersections and mutually dependent developments of, on one hand, medical and scientific advancements in the control and prevention of infectious diseases, and, on the other hand, the growth of consumerism in America at the turn of the twentieth century. These intersections and mutually dependent developments did not always occur in a straightforward manner. They often reinforced each other through persistent misunderstandings and misinformation about disease or the way diseases spread. Americans’ obsessive fear of bacteria led them to sometimes irrational actions in their fight against these new enemies. This fear also opened a conceptual space for the imaginary disease autointoxication and subsequent advertised cures for this ailment.

INDEX WORDS: Bacteriological Revolution, Germ Theory of Disease, Consumer Culture, Advertising, Sanitation Reform, Fomites, Autointoxication, Charles Bouchard, William Arbuthnot Lane, John Harvey Kellogg, Fleischmann’s Yeast, Elie Metchnikoff, Bacillus Bulgaricus, Probiotics
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For Alicia and My Parents
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Although it may not have always shown, my parents, Ellen and Reginald, instilled in me a thirst for knowledge, and they have supported me unconditionally throughout my educational process. One lesson that I learned from my mother at the dinner table when I wouldn’t eat my squash has been especially valuable to me throughout this process: always finish what you start. Most of all, I thank my mom and dad for their example as great parents and people.

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INTRODUCTION

Chicago was a filthy and dangerous city by the late nineteenth century. Cinder-flecked smoke blackened the streets and at times reduced visibility to the distance of a single block.\(^1\) Garbage accumulated in alleys and overflowed giant trash boxes. Thousands of flies communed over the corpses of dead animals, lying in the street.\(^2\) Much of this filth, along with sewage and waste from slaughterhouses, ended up in the Chicago River, which overflowed during heavy rains into Lake Michigan, the city’s clean water source. Before sanitation reforms in the 1860s, Chicago experienced cholera outbreaks for six straight years (1850-1855), leaving it with a high death rate for an American city (37.91 per thousand residents).\(^3\) Subsequent sanitation efforts and canal building in the 1870s and 1880s further improved the water source, redirecting and even changing the course of the Chicago River, but the city still struggled to keep up with its growing population and mounting waste.\(^4\)

Daniel Hudson Burnham, who was charged with the construction of Chicago’s Columbian Fair in 1893, was well aware of the problem with Lake Michigan’s drinking water. Another outbreak of cholera, which had reoccurred in 1885, or any other disease could irreparably taint the exposition and dash any hopes the directors had of achieving record

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\(^1\) Christine Meisner Rosen. “Businessmen against Pollution in Nineteenth Century Chicago.” *The Business History Review* 69: 3 (Autumn 1995): 351-397. This article gives a history of how Chicago attempted from 1860-1900 to try to eliminate the smoke problem.


By this time, the new science of bacteriology had confirmed what had been suspected for many years: contaminated drinking water caused the spread of cholera and some other infectious diseases. Burnham was building the metaphorical “White City,” which would be a place of refuge from the “Black City” with its disease, filth and violence. He could not have bacteria, the “new” foes to humans, living within the pristine walls of his city. William S. MacHarg, the sanitary engineer for the project, was ordered to build a water-sterilization plant on the fairgrounds that pumped water through a series of large tanks which aerated and boiled. Burnham also built public restrooms with clean white porcelain fixtures and a sewage-processing system to further separate his city’s sanitary efforts from the confused and largely ineffectual programs of Chicago. He even went so far as to procure the rights to naturally pure spring water from Wisconsin after a storm in 1892 again caused the Chicago River to spill its waste into Lake Michigan, threatening the water supply.

Burnham’s diligence in protecting the White City from the diseases of the Black City revealed much about the attitudes of Americans at the time. An obsessive fear of bacteria was married to the confusion, excitement and optimism of a new consumer society, which was on full display at the Columbian Exposition. Indeed, the American way of life was being transformed by the industrial, and increasingly electrical, revolutions, and the accompanying shift from a producer to a consumer society left any sense of American identity difficult to define. The

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6 Flinn, 552.
8 A collection of brief essays by some prominent Americans in 1893, which reveal a collective, and sometimes wild, sense of optimism can be found in: Dave Walter, ed. Today Then: America’s Best Minds Look 100 Years into the Future on the Occasion of the 1893 World’s Columbian Exposition. (Helena, MT: American and World Geographic Publishing, 1992).
Columbian Exposition was at once an affirmation that the country could move past the violence and social upheaval of the late nineteenth century, and also an attempt to redefine America for itself and the world.

This sense of consumer optimism was inexorably tied to science, technology and progress. Increasingly, the focus of the public was on the new science of bacteriology. Members of the educated public learned from popular books and articles in magazines and newspapers by physicians, bacteriologists or so-called “health messiahs” how to avoid dangerous disease-carriers that surrounded them. These sources also kept the public abreast of the newest achievements of bacteriologists, including the introduction of newly perceived diseases like autointoxication, or self-poisoning by bacteria in the large intestine. Advertisers of therapeutic or hygienic products sought to capitalize on germ fears and to draw people in by using endorsements by famous medical scientists.

My thesis explores the intersections and mutually dependent development of, on one hand, medical and scientific advancements in the control and prevention of infectious diseases, and, on the other hand, the growth of consumerism in America at the turn of the twentieth century. These intersections and mutually dependent developments did not always occur in a straightforward manner. They often reinforced each other through persistent misunderstandings and misinformation about disease or the way diseases spread. Americans’ obsessive fear of bacteria led them to sometimes irrational actions in their fight against these new enemies. This fear also opened a conceptual space for the imaginary disease autointoxication and subsequent advertised cures for this ailment.
The Bacteriological Revolution

Bacteriology did not immediately sweep away all other theories of disease. The development of laboratory science and the emergence of the belief that microbes caused disease had an immediate impact on surgical and medical practice, but the initial impact of bacteriology on popular beliefs was tempered by preexisting notions of how diseases spread. The miasma theory was particularly salient, especially in 19\textsuperscript{th} century sanitation efforts.\textsuperscript{9} That theory held that diseases like cholera and tuberculosis were caused by a noxious form of “bad air,” hence the concern with foul odors associated with poor sewage systems and putrefying waste.\textsuperscript{10} Consequently, sanitary reforms based on the miasma theory improved health in cities, but they were not made under correct beliefs about how diseases occurred.\textsuperscript{11}

The historiography of the bacteriological revolution is extensive.\textsuperscript{12} The key scientists who pioneered the science of bacteriology were predominantly in Europe. The French chemist Louis Pasteur (1822-1895) was originally attracted to biological inquiry in the early 1860s when he

\textsuperscript{9} Sanitation efforts before 1900, as well as the “marriage” of the miasma and germ theories in reform are recounted in: Nancy Tomes. \textit{The Gospel of Germs: Men, Women, and the Microbe in American Life.} (Cambridge, MA: Harvard University Press, 1998).

\textsuperscript{10} For the history of malodors in France and the public’s attitude towards them, see: Alain Corbin. \textit{The Foul and the Fragrant: Odor and the French Social Imagination.} (Cambridge, MA: Harvard University Press, 1986).

\textsuperscript{11} For example, the improvements in the Chicago sanitation system reduced the death rate from 37.91 per thousand in 1854-56 to 23.97 in 1856-70, and 21.4 in 1871-84. The rate continued to drop to 16.49 in 1878. The date generally established for bacteriology to be a factor in sanitation improvement is about 1885 (Tomes). Numbers from: Rauch (no. 3), 29.

received a question from an industrialist about wine and beer making. He began researching the process of fermentation, and using a microscope he found that properly aged wine contained small spherical globules of yeast cells, whereas sour wine contained elongated yeast cells. Pasteur proved that fermentation did not require oxygen, but that it nevertheless involved living microorganisms. He also realized that after wine had formed, it should be gently heated to about 50 degrees Celsius to kill the yeast and thereby prevent souring during the aging process. This process is now known as Pasteurization.

Pasteur turned his attention to spontaneous generation when the French Academy of Science offered a 2500 franc prize to anyone who could shed new light on the once again controversial theory. Pasteur showed that dust in the air contains spores of living organisms. Others had claimed that spores spontaneously generated in air. Pasteur then boiled a broth in a container with a U-shaped tube that allowed air to reach the broth but trapped dust in the U-bend. The broth remained free of living organisms for months, thereby again disproving the theory of spontaneous generation.

In the mid-1860s the French silk industry was seriously threatened by a disease that killed silkworms, and Pasteur was commissioned by the government to investigate the problem. In 1868 he announced that he had found a minute parasite that had infected the silkworms, and recommended that all contaminated silkworms be destroyed. His advice was followed and the disease was eliminated. This experience stimulated his interest in infectious diseases and, from

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13 Note that Pasteur was not the first to observe bacteria. Anton von Leeuwenhoek first observed what he called “animalcules” on tooth scrapings in 1674.

14 Gerald Geison. The Private Science of Louis Pasteur. (Princeton, NJ: Princeton University Press, 1995). Pasteur specifically debated the existence of spontaneous generation with Felix Pouchet, director of the Natural History Museum in Rouen. While he acknowledged that Pouchet’s water and air were sterile, Pasteur contended that the mercury through which Pouchet cooled his flask was contaminated with dust and microorganisms. Geison points out, however, that though Pasteur was right that s.p. did not exist, his experiments did not prove this 100% of the time. In fact, they only came out as Pasteur desired 10% of the time. In his notes, Pasteur claimed these were aberrations. The panel at the Academy of Science that ruled in favor of Pasteur was decidedly anti-s.p. and pro-Pasteur in the first place. Still, Pasteur was able to banish any thought of s.p. from Western science.
the results of his previous work on fermentation (microorganisms were anaerobic and caused putrefaction), spontaneous generation (microorganisms are everywhere, including dust), and the silkworm disease (infection could be prevented by quarantine), Pasteur developed the germ theory of disease.

The practical applications of bacteriology came almost immediately. Joseph Lister (1827-1922), an English surgeon, doubted the assertion that sepsis after surgery was due to the exposure of moist body tissues to oxygen. He regarded wound infection as a form of decomposition, so when he read in 1865 Pasteur’s suggestion that decay was caused by microorganisms in the air that enter matter and cause it to putrefy, Lister immediately saw a connection to surgery. In addition, the surgeon had heard that carbolic acid (phenol) was being used to treat sewage in Carlisle, and that fields irrigated with the solution were freed of a parasite that was causing disease in cattle. Lister began using carbolic acid to clean wounds, and also experimented with operating under a carbolic acid spray. In 1867 he announced to the British Medical Association meeting that his wards in the Glasgow Royal Infirmary had remained clear of sepsis for nine months. After initial resistance, Lister’s methods were gradually accepted by the medical community.

Pasteur and Robert Koch (1843-1910), a German who developed a staining technique for identifying bacteria, led bacteriologists in isolating bacteria responsible for infectious diseases. During the 1870s, Pasteur identified the specific bacteria involved in anthrax and chicken cholera. In the 1880s, Koch contributed two important discoveries for public sanitation, isolating the causative organisms for tuberculosis and cholera. He also demonstrated, by his investigations in Calcutta in 1897, that rats are vectors of bubonic plague. Pasteur developed a

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15 This claim had been made by Justus von Leibig in 1839. Great care was taken to keep air from wounds, by means of plasters, collodion, or resins.
method for reducing the virulence of certain pathogenic microorganisms.\textsuperscript{16} By heating a preparation of anthrax bacilli he attenuated their virulence but found that they still brought about the full immune response when injected into sheep. Using a similar method, Pasteur then inoculated fowl against chicken cholera. He was thus following the work of Edward Jenner (1749-1823), an English biologist, who had first vaccinated against cow-pox in 1796. By the turn of the century, the causative agents were known for gonorrhea, typhoid fever, leprosy, malaria, diphtheria, tetanus, pneumonia, and epidemic meningitis, with vaccines in the works to prevent many of these.\textsuperscript{17}

For the first fifty years after its acceptance, the germ theory provided its greatest utility as a guide to the prevention of disease by changing 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 understanding of the circulation of germs, they could better direct public health efforts to stop disease from spreading. Gradually, older theories of atmospheric infection gave way to a more modern perspective of how diseases are transmitted by casual contact, food and water contamination, insects, and healthy human carriers.\textsuperscript{18}

\textsuperscript{16} Another of Koch’s important contributions was aseptic reform in Germany, including the use of steam instead of dry heat to sterilize instruments. Unfortunately in 1904, some German surgeons took the “dogma of asepsis” too far. These surgeons were destroying tissue because of their use caustic (and sometimes downright poisonous) antisep tic agents in an attempt to wipe out germs completely. “Excesses in Asepsis.” \textit{New York Times} (Aug. 21, 1904): 8.

\textsuperscript{17} It should be noted that vaccines were not readily accepted by the American public. In a letter to the editor of the \textit{New York Times}, Poultney Bigelow recalled an episode upon his return from a trip to India via Honolulu in 1910. The ship doctor, fearing an outbreak of smallpox from a passenger with the disease, attempted to vaccinate Bigelow and his fellow travelers. “Panic seized upon our medical mariner,” exclaimed Bigelow, “and, unfortunately for us, his mania took the form of injecting into each of us a poison which he called vaccine. To his mania I objected, as I should object to any other manifestation of stupid superstition—as silly and cruel as many a priestly practice of medieval Europe.” Poultney Bigelow. “Vaccinated: Mr. Bigelow Had a Dreadful Time, and Tells About It.” \textit{New York Times} (Jan. 10, 1911): 10.

\textsuperscript{18} The case of Mary Mallon (or “Typhoid Mary”) confused physicians, public health officials and ordinary Americans because the concept of a healthy carrier was difficult to grasp. For more information on “Typhoid Mary,” see: Judith Walzer Leavitt. \textit{Typhoid Mary: Captive to the Public’s Health}. (Boston: Beacon Press, 1996). Leavitt.
The success of bacteriology inspired an exciting period in medical history. Indeed, the practice of medicine before the germ theory was very different. The historian Sherwin Nuland described the old process:

They bled their patients, and they puked them and purged them and blistered them as their professional forefathers had always done; they confused the metabolisms of the sick with dazzling combinations of botanicals whose real actions were only partially known, and often not known at all. They stimulated in cases whose cause was thought to be too little excitation, and they tried to induce a touch of torpor when the opposite was the case. In short, except when the need for amputation or lancing was obvious, the healers didn’t really know what they were doing.¹⁹

Professional physicians seemed inadequate in battling epidemics, especially cholera, which was responsible for the lives of thousands of Americans. Bacteriology offered doctors important diagnostic and therapeutic tools. The success in treating acute, infectious disease, along with a fusion of medicine and experimental science, instilled confidence in the public that they could rely on biology and medicine to improve and prolong their lives.

Furthermore, the American Medical Association (1847) provided a largely unified authority on the well-being of the human body. The purpose of this organization was (and continues to be) the regulation of medical practice and the enforcement of the Medical Code of Ethics in the United States. Johns Hopkins Medical School (1893) provided a model for others around the country by instituting improvements in medical practice and standardizing curriculum. Numerous measures in the early 1900s, including the creation of the Council on Medical Education, aided the AMA in accelerating the campaign to raise educational requirements for physicians.

The exclusivity and status of physicians was solidified by the endeavors of the AMA and the Food and Drug Administration, which began in 1862 as the Department of Agriculture’s


Division of Chemistry, to eliminate the sale and advertisement of quack remedies and raise public confidence in professional medicine. The Biologics Control Act was established by the now Bureau of Chemistry in 1902 to ensure the purity and safety of serums, vaccines and similar products that prevented or treated infectious diseases. In 1905 the AMA’s Council on Pharmacy and Chemistry set tougher standards for drug manufacturing and advertising of quack patent medicines and nostrum. These measures buttressed the Medical Code of Ethics, which called for professional physicians to expose frauds to the public because of the potential hazards.\(^{20}\) The 1906 Food and Drugs Act strengthened restrictions on the sale of questionable alternative remedies. Under the FDA, drugs must pass rigorous inspections and bear labels that plainly stated their contents.

Along with the consolidation of political and professional power, new cultural authority was bestowed upon doctors. Medical historian Paul Starr wrote that this newfound hegemony was manifested in the “awe and respect from the general public and legislators” that allowed medicine to set its own conditions of practice.\(^{21}\) Indeed, the rise of the medical profession depended on how its authority “penetrated the beliefs of ordinary people” to “firmly seize the imagination of its rivals.”\(^{22}\)

The public, becoming increasingly aware of the day-to-day benefits accruing from both medical science and practice, had positive reasons to view its physicians in a new light. Between 1870 and 1920 the major plagues—smallpox, tuberculosis, diphtheria and cholera—were brought under control for the first time in history. As the public confidence grew, the medical


\(^{22}\) Ibid., 229.
profession was rewarded. Governmental and private funding for medical research rose to unprecedented highs.

Pasteur, Koch, Lister and other medical scientists were lionized in books and the press. In 1897 Edward Slosson, a promoter of science and first editor of the journal Science Service, praised medicine for its “real philanthropy” of eliminating disease rather than the “blind benevolence” of the past.\(^\text{23}\) He espoused the shifting of cultural hero worship from those who take lives to those who save them. “The popular idea of greatness has been decidedly changed in the last half-century, and new standards of heroism have been established,” Slosson pronounced. “Men are coming to recognize that the heroism of those who save life may be quite as great and is certainly more admirable than the heroism that is measured by a monument of skulls.”\(^\text{24}\) In subsequent years, other books celebrating the progress and heroism of medical science were released, including Otis Caldwell’s *Science Remaking the World* (1923) and Paul de Kruif’s *Microbe Hunters* (1926).\(^\text{25}\) All biographies of major bacteriologists from this period were written with a sense of reverence.\(^\text{26}\) The elevation of modern science and physicians can also be observed in articles and advertisements in magazines and newspapers.

**The Consumer Revolution**

The concomitant consumer revolution in the United States occurred for a variety of reasons. Much of the historiography of this period points to the forces of industrialization, which

\(^{24}\) Ibid., 3.
\(^{26}\) After Gerald Geison wrote *Private Science of Louis Pasteur* (1995), which called into question Pasteur’s experiments on spontaneous generation among other revealing observations from the bacteriologists notes, the French people were in uproar because Pasteur still maintains a level of secular saint.
transformed the American economy from one driven by production to one defined by the consumer market. Since the 1960s, historians have concerned themselves with unearthing what drove consumers on a more personal level. Some scholars have examined the rise of consumerism among the working class, and even more have dealt with the middle class. Because many Americans who consumed health remedies were members of the middle class, I narrow my focus to their story.

The most notable historian of middle class consumerism is T. J. Jackson Lears, who has termed the new consumerism the “therapeutic ethos.” He posited that a move from an agrarian to an overcrowded urban lifestyle left middle class Americans without a sense of purpose. In a sense, the middle class experienced a sense of Marxist dehumanization. In Lears’ formulation, this loss of purpose drove members of the middle class to buy goods to find a sense of meaning, which had been fulfilled previously by the Protestant ethic of hard work and “salvation through self-denial.” The consumption mandated by capitalist institutions around 1900 was reinforced by advertisers, who directed many of their campaigns at the middle class. Many of the advertised goods from this period purported to improve psychic or physical well-being.

29 Lears was inspired by the work of Philip Rieff, who used the concept of the therapeutic as short-hand for psychic needs of the industrial middle class. Rieff described the emergence of “psychological man,” who was the latest character type to dominate the West. For Rieff, psychological man marked a decisive and irreparable split in the history of Western culture. He was bereft of any care for politics or religion, left only to conquer his inner life by finding some psychic security. See: Philip Rieff. The Triumph of the Therapeutic: Uses of Faith After Freud. (New York: Harper Row, 1966). Rieff. Freud: The Mind of the Moralist. (Chicago: University of Chicago, 1959).
Lears paid brief attention to the role that the professionalization and growing authority of medicine played in the rise of the therapeutic ethos; however, he did not describe the causes behind this development, nor did he dwell on its importance in the role of therapeutic advertising. He instead referred to “ministers and other moralists [who] began increasingly to conform to medical models in making judgments and dispensing advice.”

More than merely providing a model, I argue that the medical profession played a direct part in the rise of therapeutic advertising and consumer culture in America. Indeed, doctors had been advertising their personal remedies since the early 1800s, but since the 1880s the market for medical goods had changes. On one hand, the sale of therapeutics had been restricted by the AMA and the FDA. On the other hand, physicians could use their status as cultural heroes to endorse, and thus legitimize, goods marketed by big businesses, such as Standard Oil, toward a larger middle class deeply concerned with their health. Physicians and bacteriologists also became indirect participants in consumer culture when advertisers used their images and words in order to bolster their claims.

Americans were exposed to commercial messages designed to create a perpetual state of dissatisfaction with their health status and a longing for a new and improved self. Americans sought “health in a bottle” and “health in a book” through the avid consumption of medical advice. Most advertisements took on standard formats: “Don’t buy this (a bacteria-infested

32 Recent works by scholars working on this period have noticed the lack of attention by Lears of the concomitant growth of America’s religious culture. In her book In Therapy We Trust, Eva Moskowitz studies New England based on “New Thought” self-help movement of the late nineteenth century, which was inspired by radical ideas of “spiritual scientist” Phineas P. Quimby. This movement challenged the Protestant notion that self-fulfillment and the pursuit of personal pleasure in this lifetime as sacrilegious. They espoused a new optimistic vision of God with depression and feeling bad physically as a reflection of an individual’s ignorance of God. For them, God was infinitely beneficent and friendly, whose primary function was to help humans attain happiness and satisfaction; therefore, this group was interested in self-realization without losing faith in God.
33 Kenneth M. Ludmerer. Time to Heal: Medicine from the Turn of the Century to the Era of Managed Care. (NY: Oxford University Press, 1999).
handkerchief for example), buy this (a disposable Kleenex);” or “Don’t be like her (a sluggish and frail woman with autointoxication), be like her (a beautiful and regular lady); or “More doctors/bacteriologists (or a single very important one) recommend this brand than any other.”

The public expectations of the advancement of bacteriology and the doctor/patient relationship were formed by a stream of media from newspaper columns, magazine articles, pamphlets and advertisements. Advertisements were particularly important in the growing stream of information circulation, as producers sought aggressively to portray many kinds of products as essential aids in American consumers’ quest for good health.

Americans were aware of the strategies of advertisers. A 1904 article entitled “Advertising Health and Happiness” in The Independent warned that “advertising is simply a form of popular education; a school extension where any one with money enough may try to teach and where all the world are compulsory pupils.” The writer sarcastically comments on how “delightful it would be to live in Advertisement Land” where “men and women of statuesque figure, or athletes pridefully swell their muscles…a land where cleanliness and godliness both come easy.”

The American Dietetic Association acknowledged that many impassioned zealots of health were, in fact, laymen who “may have distinguished themselves in lines other than that of pure science.” The public was thus warned that “newspaper, magazines and modern advertising, some which we can believe, are filled with health message. The wise person is like the one who was always very cautious;” thus, “in matters of health education or

34 “Advertising Health and Happiness.” The Independent 54 (May 1904): 464-465; pg. 464. Much criticism for using beautiful people in advertising (including him) was directed towards Bernarr MacFadden, who made a fortune from his magazine Physical Culture, books and various health remedies. The most vicious indictment came from the editor of Hygeia, another health magazine during the 1920s and 30s, which claimed to be devoted to reporting “real science.” This battle between the two magazines went on for quite some time and would make an interesting study by itself. See: “Exploiting the Health Interest: Type of Advertising That Makes ‘Physical Culture’ Commercially Profitable.” Hygeia (Nov. 1924): 678-683.
advertising, it is important to know something about the sources and motives of the health information before relying too much on it.\textsuperscript{37} In the heady and anxious days of the bacteriological revolution, it was often difficult for ordinary Americans to distinguish between scientific advice and that of untrained laymen, and product advertising was a mirror to the public interest, need, perception and demand.

My first chapter will not deal in depth with the consumption of goods for the improvement of well-being. The consumer element of my paper will be saved mainly for my discussion of the perceived disease autointoxication and the therapeutics meant to prevent and alleviate its symptoms. In order to understand why autointoxication, which was purported to be a product of intestinal bacteria, gained such popularity in America, however, one must first become aware of the intensity of germ fears at the turn of the twentieth century. These fears were driven by the assertions by doctors, sanitarians and “health messiahs” that bacteria were, in fact, malicious and everywhere. Many Americans went to remarkable lengths in the fight against these new foes. Up to a point, the first chapter resembles the work of Nancy Tomes whose book \textit{The Gospel of Germs} is now the authority on how germ fears intertwined with social and cultural beliefs and political action in turn of the century America. While my discussion parallels Tomes’ in including public action, I focus on how germs were depicted by the media and how misinformation and misunderstanding drove an obsessive fear of bacteria.

Autointoxication is the subject of chapter two. The theory behind this “new” disease was that bacteria in the large intestine produced poisons called ptomaines when food broke down. The longer these poisons, which were given names like cadaverine and putrecine, lingered in the bowels, the greater the chance of them causing diseases, which could range from malaria to tuberculosis to neurasthenia. Therefore, constipation was perceived to be much more dangerous

\textsuperscript{37} “Science—The Guardian of the Family Health.” \textit{The Scientific Monthly} 7 (Aug. 1918): 177-179; pg. 179.
than originally thought, though the cleanliness of the bowels had been a central part of healthful living since the ancient Egyptians. The development of autointoxication was at first driven by germ fears, but even after medical scientists had discounted its validity, a belief in the theory was driven by advertising.

My third chapter deals with the specific theory of autointoxication and old age by the Nobel Prize-winning (1908) bacteriologist Elie Metchnikoff and his cure: Bulgarian bacillus, which was involved in milk fermentation and yogurt-making. American companies realized the potential of a cure endorsed by a famous bacteriologist and began selling dried Bulgarian bacillus tablets and soured milk by the bottle and on tap at bars. The American public’s fascination with Metchnikoff and other soured milk remedies remained long after medical scientists had undermined the validity of Bulgarian bacillus.
CHAPTER ONE
THE PERCEIVED THREAT AND THE INVISIBLE WORLD OF GERMS

I do not believe in telling a child ghost stories to frighten him when he is naughty. When Clifford is naughty I explain the germ theory to him and have him look through a microscope at bacteria. It frightens him terribly, and at the same time inculcates scientific knowledge.

“The Modern Mother,” 1901

“Bacteria?” Millions, no doubt,  
Are out on their deadly parade!  
I picture them bugs with snout  
And feet that resemble a spade

Lurana W. Sheldon, “Hush!” 1907

What diseases does the Fly carry? He carries typhoid fever, tuberculosis and summer complaint. How? On his wings and hairy feet. What is his correct name? Typhoid Fly… Kill the Fly in any way, but kill the Fly.

“Fly Catechism,” 1911

The noted bacteriologist and public health official Thurman B. Rice contributed a piece for the magazine Hygeia in 1926. Born in 1888, Rice recalled his childhood fears of rabid dogs, lions that supposedly roamed his neighborhood, hoop snakes that stung with their tails, and even a mythical prehistoric swamp monster. Though these beasts may have never attacked, Rice lamented that another killer did not receive more attention. “Community folk died in astonishing

4 Thurman B. Rice. “The Man-Eating Microbe.” Hygeia 4 (Apr., 1926): 187-189. Rice was a member of the Department of Bacteriology and Pathology at Indiana University before becoming involved in public health in 1933. He was appointed Indiana State Health Commissioner in 1944. His books include: Applied Bacteriology (1926); Conquest of Disease (1927); Racial Hygiene: A Practical Discussion Eugenics and Race Culture (1929); and numerous textbooks on bacteriology.
numbers in the death dealing clasp of the Man-Eating Microbe, and no fuss was made of it,’” he wrote. “The Microbe wasn’t spectacular enough; it wasn’t tangible; it wasn’t something we could fight off with a club or gun.” Rice remembered one summer when at least once a week, a baby fell victim to an outbreak of dysentery. He also described how the “silent assassin” typhoid bacillus had killed an entire family who lived down the street.

Rice went on to applaud Americans who were making every effort to keep deadly bacteria at bay. He also encouraged them to continue to stay on top of the task of learning about new threats and new means of prevention. However, Americans found conflicting reports from a number of sources debating the proper designation of bacteria and even whether bacteria existed in at all. The uncertain nature of bacteria certainly added a sense of danger and mystery to the germ theory for an already anxious public cognizant of the ravages of communicable diseases. Indeed before displacing the miasma theory, Pasteur’s theory was treated as a tentative truth as many health writers still debated competing theories of infectious diseases. One writer in 1894 reviewed convincing evidence that tuberculosis was infectious, noting that “the objection is heard on all sides that germs as active agents in the production and dissemination of disease, really exist only as phantoms in the minds of over-imaginative and impractical bacteriologists.”

Part of the problem, the public was informed, lay in the inability of the germ theory to explain certain phenomena. Why is it that the so-called cholera germ can be found in the mouths of healthy as well as sick people? Perhaps cholera was not germ-caused at all, but, as one English writer suggested, a nervous disorder. In their attempts to interpret the new theory to the public and provide a call to preventative action, some bacteriologists and public health officials

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5 Ibid., 188.
8 Bulman (no. 6), 506.
exaggerated the disease role of germs. Some told their audience that all diseases had germ origins.\(^9\) Sometimes, non-existent germs were seen, including the “well-recognized” bacterium for colds, although this illness is actually caused by a virus, which was not identified until mid-century.\(^10\) My next chapter’s discussion of autointoxication will show how these exaggerated claims set a dangerous precedent for the invention of “new” diseases that were reinforced by the fear of bacteria.

The debatable validity of the germ theory aside, germ fears were heightened by what was known about bacteria. After the 1890s, popular media became increasingly preoccupied with a single issue—the many ways which germs are able to reach us. Unlike passive and inert miasmic gases, germs were alive, opportunistic and aggressive. Readers of *Popular Science Monthly* were told that “the hostile microbe is in fact everywhere—within and without us, seeking, we might say, what it might devour.”\(^11\) The discovery of germs and their nature meant that humans must prepare for a continuing “fight with these little enemies.”\(^12\) A constant war was waged between body and germ, and as one writer in *The Independent* put it, we must therefore fight a great battle throughout life in our war against invading germs, which lurk “ever ready to step in and take possession of the body.”\(^13\)

A particularly disturbing trait of germs was their presumed ability to use an endless variety of pathways to reach their victims. Americans were told “a thousand social conditions may expose us to the invasion of microbes,” that “notwithstanding all precautions, [germs] will creep in and destroy life.”\(^14\) Another disturbing and tricky trait of germs was their ability to

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14 Capitan (no. 11), 107. Edson (no. 12), 425.
invade and then lie dormant. The tuberculosis germ, for example, “strikes painlessly and its wound is not felt for weeks or months.” In one article, the ability of germs to mutate into new varieties was discussed, and in a remarkably predictive statement anticipating germ warfare and other modern horrors, the author noted that through using the mutability of germs we “shall doubtless be able to create new diseases as terrible as we please, whose ravages will be localized at will. God forbid that this theoretical possibility should be taken literally by some investigator.”

Americans were at war with dark forces, and their only protection was what they read in magazines, articles and books, and what they bought. In the media and in advertising, germs were depicted as demons, further signifying a metaphorical understanding of their evil intent. Famous bacteriologists and public health officials, such as T. Mitchell Prudden and L.O. Howard, provided information on new defenses against germs, but even they tended to exaggerate their claims. In addition, germ fears were stirred by fame-seekers or “health messiahs” who made wild declarations about the dangers of everyday things or actions. This climate of mystery and fear opened a conceptual space for the belief in anything having to do with the perils of bacteria.

**The Demon Bacteria**

In his 1890 book entitled *Dust and Its Dangers*, T. Mitchell Prudden (1849-1924), one of America’s first bacteriologists, enthusiastically asserted, “We no longer grope after some

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17 The metaphor of war concerning bacteria versus man was first referred to in the first years of the twentieth century after the Spanish-American and Boer Wars; however, this image did not become widespread until well after World War I.
mysterious, intangible thing, before which we must bow down or burn something, as if it were
some demon which we would exercise.” Prudden’s assertion that bacteriology had dispelled
belief in demons or superstition was not true in all cases. Many bacteriologists and public health
officials were eager to equate the invisible world of bacteria to previous notions of an invisible
world of demons, which invaded the body and caused disease. This metaphorical understanding
of germs contributed to the general atmosphere of fear.

From antiquity to more recent times, people believed that suffering was punishment by
either God or the gods, or by possession of demons. In this, almost all agreed. From Greco-
Roman culture, Origen asserted that demons produced pestilence, and Gregory of Tours,
Tertullian, Gregory of Naziones all agreed. Saint Augustine said that “all diseases of the
Christians are to be ascribed to the demons.” John Wesley believed that bodily diseases are
sometimes caused by devils. These ideas ran deep, and were believed by people of all classes.
Every means of protection was legitimate to guard one’s self against such demons. As this fear
was often stronger than a belief in God or the gods, it is easy to see how conflicting emotions led
to some confusing and irreconcilable actions.

People became obsessed with preventing demon possession. In the first generations of
Christianity, it was believed that each Christian had the power to expel demons and restore the
sick to health. As time passed, the gift of exorcism was confined more and more, until in the
third and fourth centuries it was regarded as one of the functions of the clergy and especially of

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19 Cotton Mather, famous for his role in the 1692 outbreak of witchcraft in Salem Village, used the phrase “invisible
world” to refer to the supernatural workings of Satan and his agents. See: Cotton Mather. The Wonders of the
Invisible World (Boston: Benjamin Harris, 1693).
The fear of demons was evident in the Catholic Church’s efforts to protect its members from their evil influence. The means used were adopted from common and prevalent practices. In the baptism of infants, for instance, the priest used saliva to touch the ears and the nose, the ears to open them to the Word and the nose to prevent the demon from entering in and causing illness. Thus, the belief that disease enters through the nose or the mouth is a very old one.

Some bacteriologists and public health officials recognized the resemblance between demons and bacteria as evidence that the two theories of disease were on the same conceptual continuum. Dr. Otto Rosenbach, author of *Physician versus Bacteriologist* (1904), commented in an article for the *New York Times* that “in the present point of view of the bacteriologist in medical or surgical practice there is a survival, or revival, of the superstition which looked upon disease as the work of mysterious demons and the patient as the enemy of God and man.” The biochemist Paul W. Wilson stated in 1911, “All that science has accomplished, with the microscope, is to change the demons of the magician into bacteria, and exorcism into inoculation.” Near the end of his life, Charles-Edward Armory Winslow (1877-1957), one of the foremost sanitarians of his time and Public Health professor at Yale University, wrote *The Conquest of Epidemic Disease: A Chapter in the History of Ideas* in 1943. The book followed the history of medicine from demonology to bacteriology. Winslow saved the last chapter, entitled “The Return of the Disease-Demon,” to refer to his belief that the demon had, at least

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22 Forcing out the invading demon depended on making its habitation unbearable. Victims were whipped, loaded with chains, given ill-smelling and ill-tasting drugs, all in the hope that the demon would seek more congenial quarters. Often attempts were made to entice him out. Here charms, incantations and sacrifices played a prominent part. For centuries roots and herbs were prescribed because of their symbolic form. From: J.E. Greaves. “Ancient Arts.” *The Scientific Monthly* 13: 5 (Nov. 1921): 428-433.


conceptually, returned to medicine in the form of bacteria. Natural and supernatural causes of disease seemed to be linked.

In an article for *The Scientific Monthly*, Dr. Jonathan Wright, a pioneer in the Ear, Nose and Throat medical specialty, addressed the link between demonology and bacteriology in a sustained critique. He defended the thoughts of primitive man saying, “We say these are the germs of ‘rational’ medicine, but we must not lose sight of the fact that [demons] were to him no more and no less rational than his other ‘reasons’ for illness.” Wright gave a litany of the “demon theory of disease” from around the world, including Malaysia where a Swelling Demon haunts men with pains in the stomach and head. He also noted that all concepts from antiquity have attributed disease to an active and living object. “We have identified it as a germ,” he wrote, “but the germ of the idea existed many thousands of years before the discoveries of Pasteur and his predecessors…The herb sent in to drive away the disease devil is the same principle of a leucocytes versus pathogenic bacteria.”

Religious scholars also explored the conceptual problem presented by bacteriology. Methodist minister L. T. Townsend’s *Satan and Demons* (1902) included a section on “demons and the ordinary pests of the natural world,” including the assertion that bacteria were no different than the demons Jesus cast into the swine. An article by John C. Granberry, professor of practical theology at Vanderbilt University, was published posthumously in *The Biblical World* in 1911. In it he pondered a question on the minds of many Christians after the bacteriological revolution: “Did our Lord believe in the existence of demons? Maladies that we

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28 Ibid., 505.
29 L.T. Townsend. *Satan and Demons.* (Cincinnati: Jennings and Pye, 1902). Townsend wrote proficiently during his 84 years (1838-1922), publishing sixteen books on various religious topics.
attribute to other causes did he ascribe to demon-possession? This is simply a question as to whether he was familiar with the modern science of medicine, or whether he shared the unscientific views of his age.”

In other words, was the all-powerful and all-knowing Lord ignorant of bacteriology? The author concluded that it must have been the Lord’s intent to “accommodate Himself to prevailing conceptions in a pedagogical interest…The theory of accommodation springs from a reluctance to recognize any such limitation upon our Lord’s knowledge.”

One New York preacher used a scheme called “moral bacteria,” where “microbes of wickedness invade human nature and demoralize it.” He went on to say that “as Pasteur drives out his material bacteria by the infusion of an opposing force, so we must get rid of the moral bacteria by inoculating ourselves with love, purity and sobriety.”

The metaphorical connection between demons and bacteria was at play in consumer culture. An advertisement for Perry Davis’ Pain-Killer referred to headache-causing bacteria as “demons of disease,” which “attack, afflict, and kill men, women, and children who might otherwise live long lives.”

A similar ad for Scott’s Emulsion of Cod-Liver Oil expressed prevailing confusion over the nature of bacteria: “When [a bacterium] gets its grasp…the little germ, or wizard, or demon, or whatever it may be termed, gets such a hold that it is very difficult to shake it off.”

The Kolynos Company, makers of Tooth Paste and Powder established in 1915, made an explicit connection between demons and bacteria in a 1920 ad campaign. This campaign,

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31 Ibid., 103.
35 Like doctors, dentists also had to deal with the new foe bacteria. For the most part, dental hygiene was hard to afford and discolored, missing or decayed teeth were prevalent in America. After the germ theory, dental hygiene became a prominent area for aggressive marketing. White teeth and pleasant breath became requisites for popularity.
which utilized full-page space in the *New York Times*, departed from Kolynos’ earlier ads which featured quotes from famous doctors or dentists. These advertisements employed the image of devils with pitchforks to represent bacteria. The first pictured two devils poking their pitchforks at the mouth of a beautiful woman. “If a woman’s hair is her crowning glory, her mouth is the soulful expression of her beauty,” said the ad. “Protect her mouth from the demonic purposes of bacteria with Kolynos Dental Cream.” Another ad entitled “A Summer Resort for Bacteria” depicted the porch of a summer resort populated by demons preparing for the day’s activities of golf, tennis and sailing. “In July and August,” the ad warned, “hundreds of millions of restless bacteria are looking for an opportunity to get in their summer resort. You mouth is their summer resort.” An Oct. 7 ad featured the demonic figures surrounding the sink and crawling on the toothbrush. In the most straightforward ad of this type, a mouth is surrounded by demons with spears, poking cavities into front teeth. “Why let demons possess your teeth?” asked the ad. “Kolynos not only cleans the teeth but gives them a sanitary environment.”

As with many new scientific theories, the public often grabs hold of one understanding that is governed by a single metaphor or concept. With the ascension of the germ theory of and sexual attractiveness. The fact that an individual could keep dental hygiene up by using toothbrushes, toothpowders and mouthwashes was a major selling point to companies like Kolynos.

36 The first ads for Kolynos took on a familiar form: “Every druggist carries Kolynos—because a majority of the dentists in the country recommend it to their patients, and show their sincerity by using it themselves.” (From *New York Times* (May 25, 1915): 5.) In another advertisement, the company quoted William Osler, a famous physician and founder of Johns Hopkins Medical School: “‘You have just one gospel to preach, and you have got to preach it early and late, in season and out of season. It is the Gospel of cleanliness of the mouth, cleanliness of the teeth, cleanliness of the throat.’” (From *NYT* (May 28, 1915): 3).


38 Ad for Kolynos. *New York Times* (July 10, 1920): 8. This particular ad repeated for the whole summer and also made an appearance in 1921 and 1922.


disease, Americans were now told that they lived in a world where invisible, demon-like bacteria were everywhere. The public was informed that all manner of things had been examined, and found, in the eyes of contemporary experimenters at least, to be capable of harboring dangerous germs. Dust or water, especially ice, could carry germs. In addition, flies posed a living threat through the air. Fomites, or non-living objects that can harbor germs and act as agents of disease transmission, became the focus of many health writers who instructed Americans to be careful in their everyday activities and around everyday items. Kissing, drinking from a public cup or fountain, or simply doing laundry became dangerous, and coming into contact with seemingly harmless things like handkerchiefs, money or books was seen as especially risky. Germ fears dictated that the tendency was to see more, rather than fewer, perils.

**By Air and Water**

Improved roads, concrete surfaces, an increase in plastic and other easy-to-clean materials, air conditioning, and a multitude of less obvious environmental changes have created a modern urban environment that is relatively dust free. At the turn of the century, however, Americans coped with a large quantity of dust. With the advent of the germ theory, this dust increasingly came to be seen as a health threat.

This connection was first made by Pasteur in his famous experiment with the U-shaped glass. The public was told that scientific tests had shown dust to carry the germs of typhoid fever, cholera, pneumonia, tuberculosis and even blood poisoning. TB was a particular problem

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for with their diseased lungs, consumptives were frequent spitters, and their spittle would then be kicked up with the dust raised by trains, horses’ hooves or carried by women’s skirts, thus infecting others.43 “These microorganisms have high vitality and are not killed by the drying of the medium in which they are carried,” one author warned. “They remain active in the dust which readily detaches itself from the surfaces on which saliva is deposited.”44 Dangerous dust, readers were told, could settle on walls and pictures in rooms, and housekeepers were cautioned to wipe rather than sweep dust, to keep it out of the air.45

An article in the Philadelphia Herald told the story of a small barracks in England where in the summer of 1896, there were eighteen new cases of typhoid fever. The water supply was pure, but it was found that in the Autumn of 1895 three cases of typhoid had been housed in the room where the new outbreak had begun nine months later. Those furthest from the beds and the room suffered least. The flooring was taken up, the rooms disinfected, and no more typhoid appeared. A few months later, 22 cases occurred in the barracks, while the surrounding town remained free of disease. This time some dust was collected by scientists from the floor of the barracks, and the typhoid-causing bacillus was discovered laying dormant for the next group of victims.46

Some places were more dangerous than others. Public transport, with its crowds of expectorating patrons, created an atmosphere “polluted with dangerous bacteria.”47 Public buildings were also easily infected by dust-borne bacteria. “How often,” one physician asked,

“Dust, Good and Bad.” Literary Digest (Jan. 1, 1921): 26-27.
42 Biggs (no. 7), 38. Bennedict (no.15). Zimmerman (no. 42), 299. Meier (no. 42), 25.
45 Biggs (no. 7), 759. Household manuals held this kind of information for housekeepers. An example is Sophonia Elliot. Household Hygiene. (Chicago: American School Home Economics, 1907): 158.
“do we see a consumptive shivering over a register and dropping the scourings of the cavities in his lungs down the hot-air pipe, to be dried and disseminated throughout the building!” The author also suggested that when away from home, consumptives should carry pocket cuspidors or cuspidors which fitted into a man’s cane.

With the advent of the germ theory, the common house fly became a danger public enemy that attacked by air. The public was presented with evidence that the fly carried dangerous germs. Laboratory tests showed flies to carry bacteria and everyone could observe that intestinal disease, especially typhoid fever, was more common in the summer, when flies were everywhere. During the Spanish American and Boer Wars, cases of typhoid fever among troops were linked to flies.

By 1904 the house fly had been renamed the “typhoid fly” by L.O. Howard, Chief of the U.S. Bureau of Entomology and a leading student of fly behavior. In one article titled “The Most Dangerous Animal in the World” readers were told “the really ‘most dangerous animal’ comes upon its prey in a rambling, genial way, flying the flag of sociability. It is the housefly.” Some articles were embellished with appropriately alarming illustrations of the fly’s menace. It was the “baby’s deadliest enemy,” and cut short the average life span in the United States by at least two years.

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48 Benedect (no. 15), 38.
50 “House Fly’ should be Called” (no. 49), 330. Howard (no. 49), 274.
53 Ibid., 18.
The campaign against flies in cities was perhaps the most widespread of the germ craze. Much of the fly-killing was carried out by young boys who were conscripted into service by their communities. A “Fly Catechism” was devised for children:

1. Where is the Fly born? In manure and filth.
2. Where does the Fly live? In every kind of filth.
4. (a) Where does he go when he leaves the vault and the manure pile and the spittoon? Into the kitchen and dining-room. (b) What does he do there? He walks on the bread, fruit, and vegetables; he wipes his feet on the butter and bathes in the milk.
5. Does the Fly visit the patient sick with consumption, typhoid fever, and cholera infantum? He does—and may call upon you next.
6. Is the Fly dangerous? He is man’s worst pest and more dangerous than wild beasts or rattlesnakes.
8. Did he ever kill any one? He killed more American soldiers in the Spanish-American War than the bullets of the Spaniards.
9. Where are the greatest number of cases of typhoid fever, consumption, and summer complaint? Where there are the most flies.
10. Where are the most flies? Where there is the most filth.
11. Why should we kill the Fly? Because he may kill us.
12. How shall we kill the Fly? (a) Destroy all the filth about the house and yard; (b) pour lime into the vault and on the manure; (c) kill the Fly with a wire-screen paddle, or sticky paper, or kerosene oil.
13. Kill the Fly in any way, but \textit{kill} the Fly.\textsuperscript{54}

*The Washington Post* reported that there would be prizes for those children under 16 who caught the most flies.\textsuperscript{55} Although one author defended the fly as a warning sign of unsanitary conditions, most were not as willing to let the fly off so easily, as more and more students and boy scouts were employed in the campaign.\textsuperscript{56} Newspapers published locations of unsanitary places, and

\textsuperscript{54} “Warn, Instruct, Catechize” (no. 3).
\textsuperscript{56} Richard M. Winans. “Starve the Fly.” *The Independent* 74 (1913): 1128-1131.
many merchants advertised as a “flyless store.”

One article told of a boy who killed 3 bushels of flies during one summer to win a contest.

The discoveries of bacteriology also made it clear that bacteria could live in water after it had been frozen. Experiments on this subject left “no room for doubt that ice may be extremely dangerous as an addition to food or drink.” At the turn of the century, Americans obtained ice for home consumption in two ways. Some of it was “artificial ice” made by freezing water with brine or other means, but a large potion was natural ice, cut in winter from ponds and rivers and stored for future use. In both cases, especially the latter, the water used could well have come from polluted streams or lakes, and the public bore witness to an ongoing debate about ice.

T. Mitchell Prudden acknowledged that “ice is one of the most indispensable of the accessories of modern life…and it is wholly to our credit that its use has become a really noteworthy national trait.” Prudden warned, however, that ice, despite its appearance, was not “the very ideal of purity.” He reported that typhoid-causing bacteria were especially apt to lay dormant in ice, not destroyed by the cold. Prudden also called the public to action against frugal or lazy ice dealers:

The complacency with which we swallow the frozen filth which some of the ice companies at times deliver to our doors…because it is cheaper for them to harvest it where the sewers empty than elsewhere, affords a spectacle of self-abasement…If the householder be not brave enough to encounter the scorn of the ice-dealer…then ice which is used for drinking purposes may be put in a separate receptacle, so as to not come directly in contact with water.

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60 Bayles (no. 59), 644.
61 T. Mitchell Prudden. “Our Ice-Supply and Its Dangers.” Popular Science Monthly 32 (1888): 668-682; pg. 669. According to this article, 25 million tons of ice was harvested annually in the United States, with 50 million dollars invested in the business.
Ice water, a staple of comfort and civilization, was in jeopardy of being outlawed because of the fear of bacteria.

**Fear of Everyday Activities and Customs**

People were also startled to learn that they may have to give up kissing. An 1898 article cited German scientists who claimed that diseases passed through the act. “It may appeal to the imagination of lovers,” the author quipped, “when they think how trivial are the battles of their hearts when compared with the mighty conflicts of annihilation that are being waged among the myriad legions of their lips.”63 One “Kissing-Bees” in Atlanta was put on hold because of the dangers of kissing.64 This article speculated that young people would find extra interest in kissing now that it had become so dangerous. Some reported that it was safe to kiss, but the anti-kissing sentiment was so strong that it became something of a movement.65

The “Kiss Not” campaign began in 1910 in Cincinnati when a woman named Mrs. Rechtin set out to do away with the “bacteria-spreading” kiss through her World Health Organization.66 A front-page article in the New York Times announced Rechtin’s arrival.67 The followers of this cause were required to wear a red button with “Kiss Not” emblazoned in red letters on a white background. Members also had to sign a pledge that read, in part: “It is only in unity that sufficient strength can be gained to convince the world that kissing is pernicious and

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66 This WHO does not bear any resemblance to today’s WHO.
unhealthful.”68 Hundreds of flyers circulated in the mail. Rechtin’s month-by-month plan for 1910 was as follows: urge fathers and mothers not kiss babies in August; implore teenagers not to kiss in September; seek support from highway and laundry workers in October; campaign to women belonging to church clubs, card clubs and literary clubs in November; and to turn attention to lovers in December.

For all of her efforts, Rechtin was criticized in the press for taking germ fears too far. Described as an attractive woman of 35, it was purported that she had spurned kissing long before her own marriage.69 She even wished to do away with the custom of kissing a bride on her wedding day. Rechtin spent time actively recruiting in this respect: “Seventy-five prospective brides have joined the organization this month. On their wedding day they will wear the button of the society.”70 Although she acknowledged that her campaign might put a damper on some relationships, she was unrelenting: “My life for just one kiss sounds thrilling in romance and poetry. But disillusion is found in the hospitals, whence lovers follow each other to the grave in a few short months.”71 The “Kiss Not” campaign never gained any political weight, and eventually fizzled.72 It seemed that giving up the custom of kissing was simply too much to ask, even for Americans terrified by infectious diseases. Or perhaps the reading public was having a difficult time believing claims made by a woman.

68 “Kiss Not Campaign Begun” (no. 75).
69 “The Crusade Against Kissing” (no. 75)
70 Ibid.
71 Ibid.
72 In contrast, Soviet Russia did take legal action against kissing. In 1925, N.A. Semashko, Commisar of Health, successfully created an active movement against kissing and got it banned for hygienic reasons. In 1928, Order No. 722 was passed banning kisses. He had previously begun a successful campaign to ban handshaking, issuing circulars and placards that showed the evils of hand grasping. “Handshaking, Like Kissing, Condemned in Soviet Russia.” NYT (Oct. 3, 1925): 17. “Communists’ War on Kissing Satirized in Russian Press.” NYT (June 24, 1928): XX2.
Urban workers and members of the middle class drank from public water receptacles on a daily basis. These citizens were warned against drinking from the glass cups commonly seen in public places. Paper cups were introduced as a way of ending this danger, but when this was done, unexpected problems arose. In some instances the paper cups were provided at a penny each by vending machines. The public displayed an understandable reluctance to pay even so small a sum for what was formerly free, and some were outspoken in their response, such as the soldiers in Washington’s Union Station, who smashed vending machines that distributed the cups.73

Others could be seen drinking from used paper cups, probably a greater danger than using the original glass, since bacteria would be more likely to remain on a paper rim than a glass one.74 Some avoided the cups entirely, using the tops of the water tank itself.75 One writer worried about the behavior changes paper cups would create—would people drink less water if we had to pay for it, or perhaps gulp water down, or would people drink more alcohol?76 One suggested answer to this dilemma was to carry private pocket cups, but as one writer noted, this was not likely to become a universal habit.77

In addition to paper cups, another potential solution to the problem of the common drinking glass was the drinking fountain. Here, again, unforeseen problems began to surface, plaguing public health officers, and periodicals featured articles debating the many problems of drinking fountains.78 The first fountains had vertical jets, but the public was soon told that these were unsafe for the germs deposited by one drinker could remain at the top of the jet, bouncing

74 Ibid., 1119.
77 Ibid., 831.
about in the water only to fall back on the nozzle when the drinker had finished. This defect was corrected, but users were wont to place their lips on the nozzle. Guards were duly placed over the nozzles, yet troubles still remained. One observer noted that “persons with large, redundant lips, endowed with prehensile powers…do what seemed next to impossible—protrude their lips down beyond the guard…and grasp the nozzle with the lips before drinking.”

Ironically, those who should have led by example were often lax in abandoning the old ways of drinking in public. As one writer noted, “a very small protest, we must believe, would displace the single drinking glass which, in the lobby of the New York Academy of Medicine, serves the doctors and such of the laymen who attend meetings on medicine and sanitation.”

Doing laundry was also becoming an increasingly dangerous activity. The laundry basket, particularly the “old fashioned wicker basket,” was eyed critically: “Week in and week out, soiled linen is placed in the harmless-looking clothes-basket in the closet,” warned one article, “and later when the clothes are dumped out to be taken away, the basket is left with a contribution to it that is inevitable—numbers of bacteria that have found lodgement in the crevices of the reeds of the basket.” Housewives were advised to line the basket with a cloth bag, or replace it with a smooth metal or fiber one. The health of society depended on “the support that comes from the cooperation of each and every housewife that understands the essential principles of cleanliness.” These principles were that ironing must be done at 480 degrees Fahrenheit, not 300, and that laundering must be done with soap and boiling water.

81 “Sounding the Knell” (no. 75), 509.
Commercial laundries also came under heavy criticism, for some writers saw danger when one’s own laundry was mixed with the soiled laundry of others, especially consumptives. One author scolded:

In our country of advanced civilization…we have hundreds of laundries and thousands of washer-women who take away with them, to be mixed in one great foul heap, the linen of thousands of people, and not a wash is taken each week that does not contain the soiled linen of persons suffering from tuberculosis, from typhoid fever, from pneumonia, from diphtheria, and a thousand and one diseases.

If he or she escaped the perils of the laundry, the hapless citizen was told that other objects about the house, such as dishes, could bear dangerous germs.

When the unwary citizen left home other dangerous fomites lay in wait for him. The soap in public washrooms was “reeking with preceding contamination.” Public alarm, aided by such statements, led to sanitary soap vases, one of the earliest models of which was described by Scientific American in 1894. Barber shop hygiene also became a point of concern, as one article, titled “The Perilous Barber Shop,” cautioned: “The courage of the man who fearlessly enters a barber shop and seats himself in the chair without blanching, or even blenching, is not generally recognized. His bravery is unsung. Yet the perils he faces are many.” A major problem was the barber’s alum stick, used to seal shaving cuts. Readers were told that a test showed it “fairly reeked with five different species of…‘catching’ diseases.”

85 Balderston and Gunther (no. 82).
90 Ibid., 1055.
Fear of Everyday Things

A particularly dangerous class of fomite consisted of objects in circulation, especially books or money. The reading public was warned that “the volumes they borrow may bring the dreaded germs of diphtheria or typhoid fever into their homes.” In response to this threat the New York Public Library planned to disinfect books, by placing them in a metal box with a saucer full of formalin, so that after an hour or two “not a live germ can be found.” 91 Readers learned that a similar system was used for school books in France. 92

Whether in paper or coin form, a germ’s favorite fomite was money, or at least that was purported by the media and popular writers. In 1884, a report was run in the New York Times, which had learned from the Frankfurter Zeitung that a Dr. Reinsch had found, as a result of a long series of investigations, that the surfaces of old fifty-pfennig pieces were teeming with bacteria. 93 This phenomenon was not specific to German coins, for Reinsch extended his study to include small coins of a number of countries, including America, finding a thin incrustation of bacteria on their surfaces. The writer nervously exclaimed, “The revelation that [bacteria] have a chosen domicile in the most widely circulating medium which probably exists in the world presents us with a new factor in the spread of infectious disease.” 94 He recommended that old coins be washed in a boiling solution of caustic potash.

Another article of the same year termed gold coins specifically as the “root of all evil.” 95 An English doctor was cited who had injected a cat with the scrapings of a gold ten pound piece; the feline died the same day from what was purported to be a combination of cholera, plague and

94 Ibid.
clergymen’s sore throat. The author threatened a reworking of the monetary system stating, “There is absolutely no safety for us as long as we carry gold coins, and every prudent man will hereafter refuse to accept them, no matter how much he may lose thereby.” The author did mediate his comments by saying, “Of course, if the English scientific person above referred to is a dishonest man, who has been hired by silver men or greenbackers to discredit gold coin, there may be no cause for alarm.” One report asserted the “distinct antiseptic properties” of silver because diphtheria bacilli all died on the surface within forty-eight hours. In 1908, it was reported that copper and gold coins hold as much as 11,000 bacteria, while silver coins have only from 450 to 2,100. The report asserted, “Silver is a real antiseptic, as it kills any microbes which alight on it in a very short time.”

Paper money was not safe either. One article entitled “Paper Money Breeds Disease” reported that 135,000 bacteria lived on one bill. Saving money now took on new meaning. “Instead of feeling the smug satisfaction which we used to experience as we tucked away the roll,” wrote one reporter, “we are to feel that we are taking unto ourselves a perfect storehouse of microbes.” Warren Hilditch, a bacteriologist, experimented in 1908 with money he found lying around railway stations. He noted, “The popular opinion today is that paper money is very filthy and extremely dangerous to handle, as on it may be found any and all kinds of disease germs known to science.” Contrary to previous reports, however, Hilditch found no evidence of the tuberculosis or diphtheria causing bacteria on used money. Others made scientific investigations on the subject, but evidence of the dangers continued to be scanty; some even

96 Ibid.
97 Ibid.
100 Ibid.
seemed to discount the danger. In addition, there did not seem to be any indication that bank tellers or cashiers were less healthy than others.

The paper money scare of the early 1900s seems to have been started by a somewhat enigmatic figure, named Cressy “Clean Money” Morrison, who apparently sent a pamphlet titled “Clean Money—Can We Have It? If Not, Why?” to a thousand of the leading newspapers and magazines around the country. Confronted with a challenge to provide data in support of his claim that paper money was dangerous, Morrison fought back in a 1910 *Popular Science Monthly* article, claiming, unconvincingly, that such evidence existed and accusing Hilditch of misreading his own experimental data. As late as 1921, *Scientific American* told its reading public that worn out banknotes and coins were “happy homes for dangerous germs.” The article featured photomicrographs of pathogenic bacteria which look unlike any disease bacterium known to modern science.

The paper money scare did not escape the notice of politicians. The government was pointed to as a culprit of dirty money, and a “Clean Paper Money” campaign was launched. The Treasury Department proposed to clean national banknotes in a “governmental war on germs.” The Treasury also sought to replace old larger bills with standardized smaller bills, which would be designed for scientific and practical purposes to defend against counterfeiting. A new chemical wash also gave a new meaning to money laundering. In a letter to the editor of the *New York Times*, J.B. DeBeer, a doctor, wrote that it seemed coins were being ignored in the process of cleaning money: “Many persons have an aversion to handle bills and coins...Would it not be a step in the right direction to cleanse the coins as well as the bills to prevent the spread of

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104 Hilditch (no. 105), 161.
contagion?” In 1910, the Department of the Treasury’s Bureau of Engraving and Printing assumed all currency production functions, including engraving, printing and processing in response to the clean money issue and counterfeiting. Disinfectant measures were put in place in the money-making process. A redesign in paper money and a reduction of size (by 25 percent) did not come until 1929.

Personal and household items came under critical scrutiny. Handkerchiefs were a particularly vexing problem. The housewife, who was often charged with protecting the family from germs, was cautioned to take soiled handkerchiefs used by those with colds, put them in separate bags and “later when the handkerchiefs are to be washed, hold the bag over the tub, carefully placing the contents in the water into which salt has been added.” During the mid-1920s, Kimberly-Clark introduced “Kleenex” as a sanitary cold cream remover. After they learned that women were using Kleenex to blow their noses, the company began to market them as a replacement to the “germ-filled” handkerchief. Mothers were instructed to give their children Kleenex, and advertisements often pictured mothers cradling their children using the product under such slogans as, “Shrink from the hand that’s held a germ-filled handkerchief.” Indeed, germ fears transformed the way Americans viewed their environment and altered their everyday routines. Some were still apathetic, requiring public health officials and bacteriologists to press further in their efforts to educate Americans on how they could defend against bacteria.

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109 Balderston and Gunther (no. 82).
110 Ad for Kleenex. _Hygeia_ (December 1933): 1141.
Protection and Education

Germs were all around—in the air, on household objects, in the dust of streets, in ice and on flies. How could one protect himself from these invisible antagonists? Among the various strategies suggested by health writers of the time, one stands out above all others—disinfection. As early as 1894, sunlight was suggested as a practical disinfectant. According to experiments done in London, exposure to sunlight for one hour in summer and two and a half hours in winter killed most non-spore-producing bacteria.\textsuperscript{112}

A variety of chemical disinfectants were suggested for household use. Formaldehyde was perhaps the commonest. Potassium permanganate was also suggested, as were sulfur, chlorinated lime and carbolic acid.\textsuperscript{113} These were often used as fumigants—a house could be sealed and disinfectant allowed to permeate. Health writers recommended that the refrigerator be disinfected every two or three months and the house at intervals, even if no apparent reason for doing so existed. Exposure to the sick meant prompt action: “If a friend hectic with consumption pays you a visit, hasten to spray after he has departed. Eternal spraying is the price of immunity.”\textsuperscript{114}

Sometimes, disinfecting could be a real hazard. Early on, tobacco was suggested as a disinfectant. Citing the work of Italian bacteriologist Dr. Vicenzo Tassinari, who found that tobacco smoke retarded the growth of bacteria, the belief was that “tobacco is not quite so black as its was frequently painted.”\textsuperscript{115} Flies and other household insects could be killed with

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\textsuperscript{114} Wiley (no. 113), 689.
\textsuperscript{115} “Tobacco as Disinfectant.” \textit{NYT} (Mar. 17, 1889): 11.
\end{flushright}
hydrocyanic acid gas, but this deadly substance required some care. L.O. Howard suggested that a householder should set cyanide up in the house by “running rapidly from room to room and instantly closing the door behind him, descending ultimately to the ground floor or even to the cellar, running finally into the open air through the open door, which is instantly close.”

Ultra violet light, steaming, boiling, and electricity were all suggested as potential disinfectants, although the last was rapidly discredited. Ozone, a form of oxygen which could be produced by “ozonators,” was also much discussed as an effective disinfectant. It destroyed room odors, and it seemed likely that it should act as a germicide for public places and homes.

Although bacteria seemed ubiquitous and Americans at the turn of the century faced a seemingly impossible task of abolishing them, pessimism did not pervade in popular opinion. Throughout this period, one finds optimistic statements, a reflection of faith that progress, particularly scientific progress, must ultimately triumph over adversity. Some writers phrased this in terms of the increasing life span which had come about as a result of sanitary science. To other writers we would someday be able to dispose of all germs. The trend towards more cars and fewer horses, thus less street manure, was seen as help toward a disease-less future.

The move toward a germ free world required basic changes in American life styles. One article in 1904 titled “Kitchen Dirt and Civic Health” argued that whole apartment buildings should be served by a single “food laboratory.” This would not only reduce garbage but also the number of servicemen with their horses and the germs they brought. In the writer’s words,

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kitchens were “a private nuisance, and a serious injury to the public health.” In a 1907 article titled “Health Fifty Years Hence: A Picture of Life when the Knowledge of Prevention is put into Practice,” M.G. Cunniff saw Americans living in an environment of uncarpeted floors with expanses of clean polished wood, and rooms with rounded corners where no germ could hide. The “haven,” a euphemism for the rarely needed sickroom, would have an airtight door, a charcoal burner to destroy contaminated articles, and a supply of gowns for visitors to don.

Writers and health reformers acted as a constant goad, chastising, presenting examples of sanitary action, trying to shift their reading public into action against germs. America’s youth were especially targeted, as reformers attempted to alter the cultural perspectives of disease at an early age. Public health workers and civic groups helped by publicizing germ dangers through educational programs, and their efforts were reported to the public. A number of authors published short books on hygiene for school children. Many of these were women involved in Progressive reform. For example, Frances Gulick Jewett, an active member of the Oberlin College community, wrote seven books in her “Gulick Hygiene Series.” Other books were written by famous sanitarians and physicians, including Charles-Edward Armory Winslow and John Harvey Kellogg.

The American public was bombarded from all sides by health writers and sensationalists who sought to mobilize those who were still apathetic. Germ fears turned everyday tasks and

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common items into perilous activities and caused Americans to become more cognizant of their surroundings. For the most part, germ fears were driven by concerns for social and personal welfare. However, the atmosphere of fear created by these writers and activists served to drive the public into submission to any new claims about the dangers posed by bacteria. The perils of urbanized life, or civilization, were also made more clear by the presence of large armies of bacteria in cities. As I alluded to above, these exaggerated claims set a dangerous precedent with regard to the creation of “new” diseases based on the science of bacteriology. Autointoxication proved to be the most popular of these, as it posited a life-threatening condition associated with poisoning by the bacteria in the intestines. Indeed, the invention of this disease also gave advertisers an effective marketing strategy to sell their therapeutic goods meant to prevent or treat symptoms associated with autointoxication.
CHAPTER TWO

CREATING A “NEW” DISEASE: THE PROLIFERATION OF THE THEORY OF AUTOINTOXICATION IN AMERICA

Autointoxication is a disease of civilization. Wild men and wild animals do not suffer from this malady, which is perhaps responsible for more human misery and mental and moral disaster than any other single cause.

John Harvey Kellogg, 1915

Any religion that does not have a hell is a failure. Just as soon as one brand drops its hell, its adherents leave it for another that possesses one. Our hell—that is, the hell of the medical profession—is constipation.

William Arbuthnot Lane, 1925

In 1917, the New York Times ran an article about troops in Europe during World War I suffering from an unnamed disease with an unusual complex of symptoms, including mental and physical derangements. Good soldiers were being taken from the frontline, and field doctors seemed confused and ill-equipped to treat what was originally called “War Fatigue.” The author of the article, a correspondent for The Medical Record, was puzzled by the wide reach of the disease. It not only affected men who had been softened by the comforts of modern civilization, such as “artists, musicians, or some man’s or woman’s secretary,” whom he called “wholly unfitted both mentally and physically to be a soldier” This strain of “War Fatigue” was also ailing “the strong man.” The author posited that these soldiers presented with more acute ailments because they held out longer without seeking treatment. Their complaints included:

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3 “Puzzling Causes of War Fatigue.” NYT (July 22, 1917), 70.
Pains all over with…headache…elevation of temperature…chills, coated tongue, distaste for food…vertigo and roaring in the ears; the eyes may be bloodshot…Nausea, and sometimes vomiting, is present. The patient’s pulse is accelerated…His eyes are brilliant and restless, or heavy, lusterless, and dead.4

These patients suffered from something greater than mere “War Fatigue.” Field doctors misdiagnosed this ailment as anything from pneumonia to typhoid to malaria, but none of the modern treatments alleviated the symptoms. At the end of the article, the correspondent finally revealed the real culprit behind the outbreak of this mystery disease: intestinal autointoxication, caused by the putrefactive products of digestion spreading throughout the body via the bloodstream. This diagnosis had become available to physicians in about 1890 when a series of reports and experiments linked the previously supposed dangers of constipation to the nebulous evils of bacterial infection and putrefaction. The reason behind the high frequency of autointoxication among soldiers was that “continued physical and mental fatigue…depleted the functional vitality.” When this occurred, “the waste products are imperfectly eliminated and the subject is poisoned by autotoxins, which are doubtless active agents in the upsetting of the thermic equilibrium producing fever and fatigue.”5 The condition, the author instructed, could be cured by a “brisk purge” using strong laxatives and some rest.6

These soldiers were not alone in their suffering. People around the world and from all walks of life had been experiencing similar symptoms for centuries, and physicians had responded by designating the malady a different disease, depending on the medical fashion of the

4 Ibid, 70.
5 Ibid, 71.
6 The symptoms and treatment listed here are typical of all descriptions of autointoxication throughout the early 1900s (until about 1935). One note on the “coated tongue:” a chapter was dedicated to this symptom by Charles M. Campbell and Albert K. Detwiller in their book The Lazy Colon (New York: The Educational Press, 1925). According to them, the coated feeling on tongue is directly related to toxins in the blood, which lowers the “tongue’s resistance and that of other fluids…the saliva loses its power to stop the growth of micro-organisms and the mouth becomes an incubating chamber in which molds and bacteria of various sorts grow luxuriantly.” Campbell and Detwiller recommend lying in the “knee-chest position” to allow the colon to fill, then enjoying an enema at 80 degrees Fahrenheit. The coated tongue also caused bad breath, making it a “good index for intestinal health, and a foul condition of the breath speaks volumes of what may be suspected lower down.” (pg. 201)
day. By World War I, the theory of autointoxication had become the new medical fashion, although contemporaries believed that its science related directly to improved techniques and new knowledge from the bacteriological revolution. More importantly, autointoxication met a clinical need to explain and diagnose patients who presented with a recurring complex of symptoms, which did not add up to a clear organic disease. Though Pudd’nhead Wilson, a Mark Twain character, and others warned that autointoxication was nothing more than constipation with a college education, it became the era’s catchall diagnosis, the pigeonhole into which cases of headache, indigestion, impotence, nervousness (neurasthenia), insomnia, or any number of other functional disorders of indeterminate origin could be placed. From 1900 into the 1920s, autointoxication was regarded by the public as the most insidious disease of all, since it was, in essence, all diseases.

Though conventional physicians and researchers were at the forefront of developing the central theory of autointoxication, alternative practitioners and entrepreneurs soon appropriated the theory. Taking advantage of the public’s preoccupation with intestinal regularity and germ fears, these opportunists stimulated a frenzy of interest and self-treatment. Acknowledging decades of well-meaning therapy, Arthur Hearst wrote, “The sins of the colon are its diseases. But I sometimes wonder whether it is not more sinned against than sinning, for what with attacks from above with purges, attacks from below with douches, and frontal attacks by the surgeon, its sorrows are numerous and real.” Among these attackers, William Arbuthnot Lane and John Harvey Kellogg provide excellent entry points to the cultural and social implications of autointoxication. The theory of autointoxication also illuminated the symbiotic relationship

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between germ fears and consumer culture. Both played active roles in the proliferation and continuance of a belief in this “new” disease.

The History of a “New” Disease

Mysterious complexes of symptoms have been proposed as new diseases since the dawn of civilization. Many such “new” diseases were accepted as “real” because they are structurally correct and incontrovertible. Others began with names such as “melancholia,” attributed to a disturbance of the four humors with excess black bile, and now called depression. Thus, medical concepts and disease etiologies undergo historical changes. Such changes are influenced by the advancement of knowledge and techniques, but they are also subject to cultural and social conditions, especially medical fashions. For example, a current trend in gastroenterology is the high diagnosis of gastroesophageal reflux disease, which is due to current trends in epidemiology and to the lucrative pharmaceutical industry. Auto intoxication is unknown to modern physicians, but in its heyday, it was driven by both scientific and medical advancements, and by opportunistic advertisers and health “messiahs” looking to cash in on a lucrative consumer culture.

Enough wild stories of the harmful nature of constipation had circulated by 1900 to create a fertile atmosphere of fear. Dr. William Stemmerman described in his *Intestinal Management for Longer, Happier Life* the thought process of a constipated person:

There you sit, brokenhearted, horror stories teeming in your brain: the eighty-seven year old woman who died of peritonitis when impacted feces perforated her colon; the child stillborn when labor was obstructed three days by its mother’s crammed rectum; the boy whose bladder was emptied surgically because his bulging bowels had cut off urinary flow; the old Russian whose abdomen was cut open because doctors mistook his rock-hard feces for tumors; the youth whose colon was removed because doctors could not
milk the obstructing dung downward, and who will spend the next fifty years defecating through a hole in his abdomen.\textsuperscript{8}

It has also been thought since antiquity that constipation may allow harmful waste matter to poison the system. Indeed, purgatives and enemas have been components of therapeutics for millennia. The oldest complete “book” in existence is an Egyptian pharmaceutical papyrus of the 16\textsuperscript{th} century B.C. that offers as a basic explanation of diseases the notion of poisoning the body by material released by decomposing matter in the intestines.\textsuperscript{9} Egyptians believed that disease was a process of internal putrefaction evidenced by vomiting, diarrhea and mucus, and, it was thought, putrefaction can most easily be caused by waste in the colon.

This compelling explanation informed medical practice for thousands of years. The Hippocratic corpus proposed that disease arose from “superfluities” of food not completely digested, and Galen broadened the concept of putrefaction to include the waste products of organs other than the intestines.\textsuperscript{10} In the eighteenth century, Johann Kampf (1726-1787) set the stage for autointoxication principles by promoting the doctrine of infarctus. Impacted feces, originating in the humors in portal vessels and in the intestine, were held responsible for illness, inducing the French to use visceral clysters as frequently as three times a day.\textsuperscript{11} The personal physician to Louis XIV of France in the 18\textsuperscript{th} century was echoing the Ebers Papyrus and centuries of medical theory when he wrote that disease was the result of blood turned “faeculent” by contamination with “the depraved remains of concoction” in the intestines.\textsuperscript{12}

From the late 1700s onward, European and American physicians were convinced that constipation was becoming ever more common because of changes in diet, exercise levels and

\begin{footnotes}
\item[11] Ibid., 436-437.
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pace of life associated with urbanization. In nineteenth century industrialized societies, constipation was a common affliction that engendered a wide range of more serious human ailments. The health of the body was contingent on the health of the bowels, especially to a middle class concerned with the excesses of civilization and overcrowding industrialized cities. As a popular American health manual warned in the 1850s, “daily evacuation of the bowels is of the utmost importance to the maintenance of health;” without the daily movement, “the entire system will become deranged and corrupted.”

This disease theory survived for three millennia, but logic would dictate that such thinking would be abolished with the coming of the bacteriological revolution and medical reform during the last quarter of the 19th century. In truth, the germ theory served to support the ancient intuition that fecal decay triggered physical decay. To determine why this was so, one must first examine the work of bacteriologists themselves. The discovery that germs cause infection was an outgrowth of Pasteur’s studies demonstrating that germs cause putrefaction of animal and vegetable matter outside the body. Indeed, Pasteur called his discovery the germ theory of putrefaction. While this designation may seem to be merely semantics, the term “putrefaction” had been put forward with regard to intestinal ailments by the American physician James Jackson in the early 19th century. He suggested that animal food, “if it is not digested, it then putrefies [with] acetous fermentation of that which is vegetable…morbid irritability of the stomach, bowels, urinary organs, and so of other parts of the system.” The first practical application of Pasteur’s findings, the introduction of antisepsis into surgery by Lister, further confirmed the connection between intestinal health and putrefaction. Lister used carbolic acid to

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suppress surgical wound infection because he thought of wound inflammation as putrefaction by germs, and carbolic acid was known to inhibit putrefaction in sewage.

What was the colon if not a sewage pit teeming with bacteria, a cesspit that was never sanitized nor, in people with constipation, emptied? Would its germs spread to the rest of the body? In 1868, Hermann Senator (1834-1911), a clinical professor at Berlin University who had previously conducted innovative research on the treatment of fever, was the first to suggest that proteins in the intestinal tract, decomposed by normal flora, putrefy and produce chemicals (such as hydrogen sulfide) that are toxic to the host, leading to a self-infective condition. Senator reported on a 38 year old patient who suffered from multiple health problems. He believed the patient’s ill health was the result of the normal intestinal flora carrying its byproducts outside the intestinal tract, where they proved to be toxic. He referred to this process as self-infection or autointoxication.

In Britain, Lauder Brunton (1844-1916) claimed in 1880 that “absorption from the intestinal canal of substances generated in it by fermentation or imperfect digestion” could cause nervous depression, or neurasthenia. In the same year, Robert Bell similarly claimed absorption of fetid matter from the large intestine “of necessity produced a form of blood-poisoning” that led to lethargy and depression. In 1885, Ludwig Brieger (1849-1919), a German internist known for his work on metabolic and infectious diseases, published *Ueber Ptomaine*, a work

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16 Chen and Chen (no. 10): 435. The correct citation for Senator’s seminal article is as follows: Hermann Senator. “Ueber einen Fall von Hydrothionamine und über Selbstinfection durch abnorme Verdauungsvorgänge.” *Berliner Klinische Wochenschrift* 5 (1868): 254-256. In her 1995 article for *Journal of the History of Medicine* entitled “Doubtful Theories, Drastic Therapies,” Micaela Sullivan-Fowler disputed that Hermann Senator was the first to suggest a cohesive theory of autointoxication. Instead, she dated Senator’s article 1888 and named Charles Bouchard the first in 1887 to come up with the “new” disease. The first publication of *Berliner Klinische Wochenschrift* was in 1864; therefore, the 5th edition, one per every year, would have been 1868, not 1888. Chen and Chen (no. 8) and others also cite Senator as the first.


concerning the chemical processes that proteins of flesh incur during putrefaction. He gave the name “ptomaines,” derived from the Greek word for corpse, to the basic products of protein formed in putrefaction. He believed that the absorption of ptomaines, initiated by anaerobic microorganisms, was harmful. His findings led to a widespread interest in the possibility of safeguarding health by reducing the formation and absorption of these noxious products from the colon. Brieger’s observations caused fears of “ptomaine poisoning” and added new life to the old suspicion of bowel contents as pathological.

It was an 1887 book by Charles Bouchard (1837-1915), a physician and botanist from Paris, which popularized among the medical community and the lay public the “new” disease intestinal autointoxication. In Bouchard’s time, physiologists, including those we now term biochemists, were just beginning to identify the chemical substances produced by the breakdown of foodstuffs, the chemical nature of bodily fluids such as blood, urine and bile, and the metabolic byproducts of bacteria. Confusion could not be avoided with technological tools that were simply too crude to provide the precision necessary to confirm or contradict the plethora of conclusions that came and went.

In Bouchard’s formulation the body produced toxins normally and constantly. These derived from four sources: the metabolism taking place in the tissues, the secretory organs (e.g., bile from the gall bladder), foodstuffs and, mainly, putrefaction. Poisons found their way into the bloodstream, but for the most part no disease resulted, partly because the liver neutralized some of them, but principally because they were excreted by the kidneys. For Bouchard, then,
“The healthy man is both a receptacle and a laboratory of poisons.” 24 Autointoxication resulted when there was an increased production of normal toxins beyond the corrective capacities in the liver and kidneys, or there was a production of abnormal matter. 25 “Man is in this way constantly living under the chance of being poisoned; he is always working toward his own destruction; he makes continual attempts at suicide by intoxication.” 26

Bouchard emphasized the tie between constipation and autointoxication when he observed that the intestines eliminated most of the poisons formed there by putrefaction, but not all, because the slow movement of the bowel’s contents allowed some absorption. It stood to reason that the abnormal situation of constipation would allow even more. 27 Building on the work of Senator and Brieger, Bouchard experimented on animals with ptomaines that were excreted in the large intestine when intestinal flora broke down protein residues. The animals were invariably poisoned by the substances. Thus convinced of ptomaines’ deadly implications, Bouchard gave two individual toxins the names “putrecine” and “cadavarine.” He maintained that while intestinal toxins absorbed into the bloodstream never reached immediately lethal levels because they were neutralized by the liver, they were never entirely eliminated either. He spoke confidently of “stercoraemia” and “copraemia” (Latin and Greek derivat es, respectively, for fecalized blood). He also reminded colleagues that individuals differed greatly in susceptibility to various poisons, the most vulnerable being the aged with their weakened kidneys and livers. 28 Bouchard’s dramatic revelations caught the attention of other physicians and the public alike. Bouchard became so famous (and arrogant) for his theories that by 1908,  

24 Ibid., 281.  
25 Ibid., 9.  
26 Ibid., 14.  
27 Ibid., 15.  
he was being called “Le Roi-Soleil” (the Sun King) by Parisian newspapers during the student riots at the Medical School of the Sorbonne.  

Bouchard’s influence was both pervasive and ultimately enduring. One who was directly influenced by Bouchard was the British surgeon Sir William Arbuthnot Lane (1856-1943), one of many famous physicians and surgeons to train at Guy’s Hospital in London. Lane made valuable surgical contributions before he developed his “obsession” with the colon and its removal, which would eventually end his career in relative disrepute. His work on fractures included the introduction of the “no-touch technique” in open reduction and plating of long bone fractures by Lane’s steel plates. His observations of human bone structure led his thinking into his conception of intestinal stasis and autointoxication.

Lane was impressed by the body’s ability to lay down additional bone in response to chronic stress. If, for example, a formerly straight bone is fractured and heals in a bowed shape, unnatural stress is placed on the concave surface and new bone thickens and strengthens the affected bone. The stress lines and new bone are easily visible by X-ray. With this in mind, Lane’s argument was essentially evolutionary. The seeds of intestinal stasis were sown when humans, whose abdominal structures were designed for a four-footed posture, evolved into upright beings, producing an abdominal wall which was no longer able to hold the organs in their normal position. Thus, by 1896, it was held that all the digestive organs were susceptible to displacement and descent. The downward pull of these displaced organs placed stress on the tissues that normally held the structures in place. This produced lines of stress in which

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29 “Riots of Students to Bring Reforms.” Washington Post (Dec. 27, 1908): C3. Incidentally, the rioting students were demanding more “hands-on” training in hospitals, instead of “theoretical” education. Bouchard, a prominent member of the faculty at the time, was responsible for the institution of a “superior medical diploma.” Holders of these diplomas would be given preference when in the running for high government or university positions.

30 Lane began training at Guy’s at the age of 16 and continued there for the duration of his medical career.


thickening of the membranes occurred. At particularly vulnerable points such as the natural
t junction where the small bowel enters the colon, these stress bands narrowed or kinked the
intestines (Lane’s kinks, they came to be called), slowing movement of the bowel’s contents and
resulting in the condition Lane termed intestinal stasis.

For Lane, Bouchard’s theory was confirmation that the large intestine was not only a
vestige of evolution, but a potential danger if kinked. Another important factor shaping Lane’s
outlook was a bacteriological study on intestinal bacteria. By the mid-1890s most physicians
agreed with Lister that organs of normal animals were sterile. In human beings this was
reinforced by the discovery that in the newborn, the bowel was free of bacteria, although it
became heavily colonized within a few days. These beliefs led naturally to the conclusion that
the large number of microbes always present in the human bowel may be pathogenic or at least
begged the question: Are they indispensable? Was the colon indispensable? Lane chose to
solve the problem of intestinal bacteria and kinking by performing surgery on his patients to
remove the colon. This radical treatment brought fame and eventually ridicule to Lane and
anyone who agreed with the practice of colectomy.

While autointoxication was at first met with “incredulity and jesting,” by the end of the
century the theory was widely accepted. Dozens of publications had appeared in France,
Germany and the United States on the “new” disease; there were none in Britain, as they had

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34 Ibid., 1-13.
35 Ann Dally’s book explores how surgical advancements, like anesthesia and antisepsis, led many surgeons to
perform experimental surgeries or what she calls “fantasy surgery.” She suggests that Lane would have never tried
collectomies without these advancements. Also important to Lane were the discovery of the X-ray, which was in
clinical use at Guy’s Hospital by 1898, and the introduction of contrast media, which allowed the intestinal tract to
be visualized in a relatively normal state of function. See: Dally (no. 29), 150.
36 Bouchard (no. 23), 163.
their own gastrointestinal fixation related to constipation: visceroptosis. It has also been suggested that despite Lane’s efforts, a lack of support among the British medical community prevented autointoxication from grabbing a foothold. In contrast, the number of articles and level of support in the United States rapidly increased. A physician writing in the *Journal of the American Medical Association* in 1893 warned of “the morbid influence of habitual constipation,” which generated “a mass of ptomaines to be seized by the active absorbents of [the intestine] and thrown back into the general circulation, poisoning tissues wherever they go and defying the liver, kidneys, or any other emunctory to cast them out.” At Mt. Sinai hospital in New York City, autointoxication as a diagnosis was in use before 1900. Overall, the diagnosis of autointoxication in New York City was nonexistent from 1891-1895; between 1896-1900, it reached 50,000; between 1901-1905, diagnoses pinnacled at 200,000; between 1906-1910, 130,000 cases were reported; by 1911-1915, only 80,000 diagnoses were made; and by 1916, autointoxication was again virtually obsolete in hospitals.

In the end, it was autointoxication’s purported association with constipation that encouraged much medical zealousness and lay appeal in America. Constipation or the lack of a daily bowel movement had been a concern of patients and physicians long before the new theory. Books like John King’s *The American Family Physician* (1860) underscored the vagaries of constipation related to autointoxication.

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37 Visceroptosis essentially pertains to what Lane described: internal organs compressed and displaced by poor posture. The displacement stretched the attachments which hold the stomach, liver and kidneys in their proper place, and as a result they were suspended in a lower position. Kinking developed from this. For in depth analysis, see: Harry Bedingfield. *Visceroptosis and Allied Abdominal Conditions Associated with Chronic Invalidism.* (London: Oxford University Press, 1930).


41 Baron and Sonnenberg (no. 38) used data from Mt. Sinai, the Bellevue Group, Beth Israel, Brooklyn City, Brooklyn German, German New York City, New York Hospital, Presbyterian, Roosevelt and St. Luke’s.
costiveness with recommendations for daily evacuation of the bowels, warning that illness and death would be courted by neglecting a regular routine.\textsuperscript{42}

Constipation was often a complaint of patients with no definite pathology, who had been previously diagnosed with neurasthenia or hypochondria. Mental and physical lethargy, poor appetite, headache and coated tongue were but a few of the reported symptoms accompanying constipation.\textsuperscript{43} The mystery of these symptoms was lost with the availability of autointoxication as a diagnosis. John H. Tilden, MD, wrote in 1926:

\begin{quote}
In chronic disease, the treatment, first, last and all the time, must with a view of getting rid of toxemia. This consists of correcting whatever habits of life are producing enervation, and then gradually building up a normal digestion, assimilation and elimination. After fifty years of floundering in the great sea of medical and surgical speculation to find the so-called diseases, all I could find was that all the people were sick part of the time, and part of the people were sick all of the time. But Glory be, all of the people were not sick all of the time. Some people got well under my treatment and friends would say that I ‘cured’ them. Others died, and friends would say that Providence removed them. I knew that I did not cure those who got well, and I did not like to acknowledge even to myself that I had killed those who died. I took a long time to evolve out of the one conventional idea of many diseases into the truth that there is but ONE disease, and that the four hundred catalogued so-called diseases are but different manifestations of Toxemia—blood and tissue uncleanness.
\end{quote}

Bacteriology had given American physicians the “mother of all diseases.” Autointoxication remained salient in American culture because of its continued promotion by advertisers selling remedies for constipation, such as high fiber foods and laxatives.

\textsuperscript{42} John King. \textit{The American Family Physician: For the Use of Physicians, Families, Plantations, Ships, etc.} (Indianapolis: A. D. Streight, 1860): 53.

\textsuperscript{43} These and other costive patients often suffered from “universal symptoms,” vague and commonplace sensations characterized by their (1) subjective nature, (2) frequent occurrence, (3) inconsequential impact on health, (4) misnomers that deem them susceptible to treatment, i.e. “sinus headache,” and (5) occurrence in serious illness as well as in minor maladies.
The Popular Appeal of Autointoxication

Sewer gas as an environmental threat no doubt heightened the appeal of autointoxication because of their apparent similarities. In the early 1900s, the miasma theory had not been completely defeated, and many still believed that disease could be spread by poisonous gases. Autointoxication appeared to be a marriage of the miasma and germ theories. Miasma was understood as the gaseous product of putrefaction, so once it became apparent that putrefaction was the result of microbic activity, miasma could readily be reinterpreted as a product of germs. Sewer gas became the updated version of miasma vapors, seeping through the very drains that the sanitary reform movement had instituted to protect society from the old form of miasma.

There was disagreement as to just how germs were related to miasmatic places. Some argued that collections of decomposing matter from ground cellar or sewer produced “hot beds” of germs.44 Others took a more moderate view—that dampness and decay did not actually breed germs but did help them to keep their virility.45 Some saw miasmatic gases, particularly from sewers as wafting germs into the air to infect the unwary.46 Regardless of which view a writer held, he joined with the others in alerting the reading public to the danger of miasmatic places. Sewers were an especial threat. If a householder suspected leaks in his sewer pipes, he could use the “peppermint test.” An ounce of peppermint oil was mixed with a pail of hot water and poured into a ventilating pipe outside the house. Any peppermint odor in the house would indicate escaping sewer gas.47 One writer urged that houses be germ-proofed at the time of

construction—asphaltum, concrete, even lead could be used to seal the house from dangerous germs which could be “generated in the soil under our very homes.”

Autointoxication became connected to sewer gas in the same way that flatulence was to miasma earlier in the century. Nearly every book about the human body published at the turn of the twentieth century equated the alimentary tract to a sewage system. Indicative of this trend is Dr. Alcinous Jamison’s description of the intestines. He wrote that “the putrid fecal mass of solid and liquid contents accumulated in the artificial reservoir at the end of the intestinal sewer.” This buildup was the center from which morbid poisons and gases were absorbed and returned to the blood to be taken to all parts of the body. Thus released, such poisons “clogged the glands, choked up the pores and obstructed circulation.” The large intestine was the body’s drainage system, and the compounds generated by microbial action in the colon had a highly unpleasant odor. The key was eliminating this odor: “Perfect sewerage is the price of health, in our bodies no less than in our houses, and any deviation from this is sure to bring penalty.”

Besides the way autointoxication “fit” American thinking about sanitation, its connection to constipation gave it its greatest appeal. No one was a more tireless promoter in this regard than John Harvey Kellogg (1852-1943), who preached the no meat, high fiber diet of Seventh Day Adventists from his Battle Creek Sanitarium in lower Michigan. Always a proponent of mineral oils and laxatives, autointoxication gave scientific credence to the former surgeon’s religious diet and confirmed his worst suspicions about constipation. He wrote three books on the subject: Colon Hygiene (1915), Autointoxication or Intestinal Toxemia (1918) and The

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48 Baumann (no. 46), 17.
50 Ibid., xvi.
51 Marcus Hatfield. The Physiology and Hygiene of the House in Which We Live. (New York: Chautauqua, 1887): 149-150.
Itinerary of a Breakfast (1918). He claimed that bacteria in the stomach produced “tox-
albumins which closely resemble and sometimes exceed in virulence the venoms of the most
poisonous reptiles.” In order to sell his remedies and his books, Kellogg had to convince
unsuspecting Americans that they were constipated.

Kellogg did not aim his message at the Americans who were obviously constipated, for
they were aware of their problem. He instead wanted to reach those who thought they were
regular by defecating once per day. “One daily evacuation,” Kellogg announced, “is chronic
constipation. Nature never intended that the interior of man should be degraded to the condition
of a privy vault.” The healthy man, Kellogg instructed, defecated three or four times a day.
Americans were also instructed on the proper shape of their excrement: “The normal form and
consistency of stool is that of soft mush. The so-called well-formed stool is the result of
constipation. When food residues find their way to exit in twelve to sixteen hours, they have the
consistency of thick puree.”

Unhealthy persons did not need to examine their feces, however, because according to
Kellogg, they would smell them first. “The highly offensive and often loathsome character of
the stools” was an indicator of constipation. “Putrid, rancid, nauseating odors always indicate
putrefaction.” Kellogg envied the gorilla because, he posited, it lives to one hundred ten and
has the strength of ten men because its bowels are pure. Praising the inoffensiveness of gorilla
stools, he quoted one examiner of the gorilla’s alimentary canal who said “the gorilla is the

52 Kellogg’s books were reprinted numerous times. Colon Hygiene: 1916 (3), 1917, 1920 (2), 1923 (2), 1985. Auto-
53 John Harvey Kellogg. Autointoxication or Intestinal Toxemia. (Battle Creek, MI: Modern Medicine Publishing
55 Ibid., 152.
56 Ibid., 155.
cleanest thing I ever encountered in my life.” Kellogg saw these foul odors, misshapen feces and constipation in general as punishment for the corruption of civilization and the laziness of modern man. Autointoxication was man’s punishment. More serious problems were in store for those who did not seek help: procitis, psoriasis, diverticulosis, gallstones, kidney disease, rheumatism, goiter, TB, and cancer all started with fetid bowels in Kellogg’s formulation. Citing a fellow physician, he asked, “Who has not seen a prodigious evacuation of the bowels at the hands of a physician terminate a case of insanity?”

For the extreme sufferer, there were extreme methods. Kellogg noted that a profuse and continuous motion of the bowels was produced in India by smacking the constipated sufferer in the stomach with a spade; however, he was not that extreme, preferring instead to roll a twenty-pound cannon ball along the curves of the colon to propel feces from the body, to stimulate the anus with a dumbbell vibrator, or to administer enemas. The nightly flush was essential to good living. A solution warmed to 90 degrees flushed the bowel and another, 80 degrees, toned up the colon afterwards.

These cures were offered by Kellogg at his sanitarium, but only a few could take advantage of such close attention. He wanted to reach millions, so he turned his attention to diet. Kellogg realized that meat made excrement smelly, and he also knew that fatty food was constipating. Englishmen, notorious beefeaters, exemplified the problem with their sallow complexion and bad breath. They were all constipated. No wonder they needed a surgeon like Lane to cut out their colons. Man could only end his self-poisoning, Kellogg concluded, with a

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58 Ibid., 34.
60 Kellogg. Autointoxication (no. 53), 130.
dietary revolution. In his sanitarium the doctor put severe cases of autointoxication on an all-milk diet. Six quarts a day were drunk at half-hour intervals. Normal bowels, however, could accommodate a little more solid. For the average man with no acute poisoning, a state of health could be maintained with a substantial diet of milk and half-cooked grains. With his brother William Keith Kellogg, John Harvey began producing half-cooked grains as cereal in 1897.61

The celebrated physician and proponent of electrical therapy Edward B. Foote (1854-1912) also heightened fear and awareness of autointoxication through his extraordinary success stories. The most incredible of these was recorded in his 1892 book *Auto-tox-aemia, Self-Poisoned Blood.*62 A testimonial told the story of a Utah boy who was “paralyzed from the hips down; his feet were drawn up to the body…He suffered all the time…We expected his death at any hour. His weight was fifty pounds.”63 When in 1891 the boy’s mother took him to Foote, the transformation was remarkable. After two months of treatment, he began to regain mobility; after ten months, he could walk without crutches. He returned to school and weighed 72 pounds. How was this done? Foote used both hydrotherapy, one of the most common treatments for autointoxication, and sweating in order to cleanse the body of its “home-made” toxins.

“Physicians do not work miracles,” he wrote. “We must be content to utilize the latest techniques provided us by modern science.”64 Foote was ahead of his time. High colonic

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61 It should be noted that John Harvey did not invent the concept of the dry breakfast cereal. That honor belongs to Dr. James Caleb Jackson who created the first dry breakfast cereal in 1863, which he called “Granula.” Originally called the Sanitas Food Company, the Kelloggs’ company would later become Battle Creek Toasted Corn Flake Company and later the Kellogg Company. The Kelloggs had a falling out in 1906 over the addition of sugar to cereals. They never spoke again.

62 Foote was one of the most successful health writers of the 19th century. His *Medical Common Sense: Applied to the Causes, Prevention and Cure of Chronic Diseases* went through 10 re-printings (1858, 1859, 1860, 1862, 1864, 1865, 1866, 1867, 1870, and 1877). There were 26 editions of *Plain Home Talk about the Human System* (every year between 1870 and 1903, except for 1875, 1876, 1877, 1878, and 1895). Both books were translated into German.


64 Ibid., 51.
irrigations, which were deemed more effective than enemas and laxatives for clearing out intestinal bacteria, became popular after 1910.65

      Autointoxication was also visible to the public because of the media’s coverage of attacks on celebrities and the rich and powerful. Indeed, intestinal bacteria did not discriminate. However, no one was surprised when Emory Titman died of autointoxication in 1927. He was only 37 years old and weighed 587 pounds at his death, claiming to be “the second heaviest man in the United States.”66 A regular in news stories, Titman had gained celebrity for his unusual life. Born to a wealthy Philadelphia manufacturer, he inherited a considerable fortune when his father died. At that time, physicians told him that he had not long to live on account of his weight (then 350 pounds), so Titman proceeded to spend his money extravagantly on friends. In a few months, he weighed 610 pounds, but after his money had run out, he had dropped some weight and had been working at a Turkish bath and as a taxicab starter. In 1920, Titman became the largest prisoner ever tried in Westchester County Court after he tried to pass an illegal check for one hundred dollars.67 Nine months before his death, Titman attempted to board a seaplane, but could not be lifted off the water.68 Normally the Curtiss plane could lift three average weight passengers.

      Titman’s poor health and dire financial situation at the end of his life seemed typical of the majority of people who suffered from bacterial diseases; however, neither the physically fit nor the rich and powerful were immune to autointoxication. James E. Sullivan, one of American’s great sportsmen, founded the Amateur Athletic Union and helped reestablish the

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65 See: Whorton. *Inner Hygiene* (no. 13), 113-140. The “J.B.L. Cascade,” one of the most popular hydrotherapy treatments, was begun by Charles A. Tyrell who specialized in bathing for 25 years. The bath was said to “permanently relieve constipation, and absolutely prevent Auto-Intoxication.” Ad for “J.B.L. Cascade.” *NYT* (Oct. 3, 1915): 14.


Olympic Games. Doctors O’Connell and Keane at Sullivan’s bedside in the winter of 1912 reported that their patient’s high fever was attributable to autointoxication; however, his condition was not life-threatening. He was treated with enemas and Kellogg’s milk diet. Paul Morton, president of Equitable Life Assurance and former Secretary of the Navy under Theodore Roosevelt, became a victim to autointoxication in 1911 when he dropped dead at the age of 53. Morton was described as a “very temperate man. He ate sparingly, drank and smoked not at all. For breakfast he would eat some times a grapefruit, nothing more.” In 1922, Florence Mabel Kling Harding, wife of the President, was reported to be suffering from autointoxication. A front page Washington Post article reported: “The physicians are making every effort to prevent a spread of toxic poisoning which is one of the chief dangers threatening Mrs. Harding’s recovery. To overcome this complication by carrying off poisons through the pores of the skin, a sweating process is being resorted to.” Mrs. Harding recovered initially, but she eventually succumbed to a kidney ailment in 1924, a year after her husband’s death in office.

Advertising Autointoxication

With the public already afraid of anything to with the dangers of bacteria, advertisers had a relatively easy time convincing middle class Americans that bacteria in their intestines were destroying them from the inside out. In addition, the medical community’s support of the theory, and their appearance in promotions and endorsements legitimized laxatives and health foods as

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72 Interestingly, President Harding had been treated at Battle Creek Sanitarium in 1889.
cures. Endorsements also came from some unlikely sources. The volume of these products on the market exhibited wide appeal among American consumers.

Whole-grain breakfast foods were advertised early on. The Kellogg Company was straightforward in its approach. “Within the body,” one ad read, “[Kellogg’s All-Bran] absorbs a great deal of toxins, and forms a soft mass, which gently clears out the intestinal wastes.” Kellogg’s Krumbled Cooked Bran was endorsed by Alfred W. McCann, the so-called “world’s greatest food authority.” McCann asked:

Why do we neglect the extraordinary medicinal properties of wheat bran in our vain efforts to obtain relief from constipation, a disease that if not corrected leads to many dreadful evils? W.K. Kellogg…has perfected a product that contains all the vitalizing, tissue-sweetening and laxative properties…to protect the body against the poisonous substances found in the intestinal tract as the result of sluggish elimination.

Post cereals warned that 75 percent of all disease was due to faulty elimination. Ralston jumped at the opportunity with testimonials from six mothers whose children had conquered constipation, thanks to Wheat Foods and Branzos. Cereal makers, however, did not corner the autointoxication market.

Standard Oil saw profit potential in anti-autointoxicants, and developed Nujol (nudge all), a mineral oil treatment. Their campaign was directed to the urban middle class seeking relief from chronic constipation brought on by the stress and poor diet associated with modern civilization. “Are You Giving Your Best to Your Work?” asked one ad. “Can you do your best if your mind is dulled by auto-intoxication? Is it any wonder that you get ‘too tired to think’ if all the while your blood is bathing every nerve, every brain cell, every muscle fiber with the

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73 Ad for Kellogg’s All-Bran. *Hygeia* (April, 1925): 379.
74 Ad for Kellogg’s. *NYT* (Aug. 22, 1919): 9. McCann wrote such books as *Starving America* (1913), *The Science of Eating* (1919), which went through 9 re-printings, and *The Science of Keeping Young* (1926). In 1925, he wrote *God or Gorilla*, in which he described Darwin’s Theory of Evolution as “the most spectacular hoax of a hundred years.” In 1931, he died of apparent aluminum poisoning.
75 Ibid.
76 A good example of Post’s more sensational ads can be found in: *The Independent* (May 21, 1916): 321. Ironically, C.W. Post was once Kellogg’s patient before becoming his biggest rival.
fermented poisons and wastes of constipation?” Nujol was advocating a gentler treatment than laxatives and colonics for it was a mineral oil that acted by “lubricating, not irritating.” In essence, Nujol’s purpose was to make the body run like a well-oiled machine. Included in their ads were many testimonials from the highest medical authorities to justify the high price (75 cents) of each bottle.

After 1919, the theory of autointoxication began to fall out of favor in the medical community. In that year a debate beginning with the Royal Society of Medicine in London made its way to the United States. One criticism was that the proponents of autointoxication never managed to demonstrate the presence of any virulent toxins in the human bloodstream; their proof of the condition was exclusively symptomatic or clinical. A certain complex of symptoms came to signify a patient suffering from autointoxication. As one American gastroenterologist argued, “There is no real evidence to support the theory of intestinal toxemia…the pathologic findings can be explained more easily in other ways.”

In 1922, Arthur Donaldson, an American physician, conducted an experiment that tested the validity of the symptom-complex basis of the theory of autointoxication. The most common symptoms—sluggishness, headache, irritability, bad breath—became evident when five men were instructed not to defecate for 90 hours. These symptoms cleared up immediately when the men were given enemas and resumed normal bowel function. If toxins had indeed entered the bloodstream, would there not be lingering or even long-term effects of such a bout with

77 Ad for Nujol. *NYT* (Nov. 8, 1915): 9. See also: Nov. 10, 1915, “Cheer Up—Brighten Up!”: “the blues’ is frequently a symptom of constipation and its attendant evil, auto-intoxication.”
80 Arthur Donaldson. “Relation of Constipation to Intestinal Intoxication.” *JAMA* 78 (1922): 884-888. One physician reported the case of a man who went 368 days, from June 18, 1900 until June 21, 1921 without defecating. Another reported on a 77 year old gentleman who for nineteen years had evacuated only fortnightly on alternate Saturday nights.
constipation? This experiment and others suggested that constipation had only mechanical, not chemical, effects.

The most thorough critique came from British physician and former autointoxication supporter Harry Bedingfield in 1929 who concluded, “Conditions as diverse as nervous dyspepsia, nephroptosis, gastrophtosis, visceroptosis, autointoxication, intestinal sepsis, chronic appendicitis, cecum mobile and others too numerous to mention merely represent different interpretations of a single-symptom complex.” Differences in incidence both between and within hospitals may have been due to differences between doctors rather than between populations. Autointoxication, then, was a non-diagnosis and may have represented no disease or a misdiagnosis of “real” GI diseases, such as intestinal ischemia, peptic ulcer or, simply, constipation.

The anti-autointoxication diet of all vegetables was attacked by American physician Max Ernest Jutte. Meat, which had fallen out of favor mainly because of Kellogg’s assertions that it was most prone to putrefaction, was defended again: “Meat as an article of diet has been somewhat discredited by the dietetic developments of recent years, pushed back in a corner behind the much-praised spinach and cabbage and raw fruits and vegetables.” Jutte looked to resurrect the image of meat, and sound the death knell of autointoxication.

Oblivious to this death knell, advertisers continued to use the language of autointoxication to sell therapeutics between 1919 and 1931. In many cases, the campaigns became more aggressive. Standard Oil was not above using a mother’s guilt to sell Nujol. An advertisement in *Ladies Home Journal* told the story of a sick baby: “I sat up in bed with a start.

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Again I heard that pitiful cry so full of suffering and helplessness.” A call was made to the family doctor who told the mother: “Mrs. Fisk, your baby has been very ill. Perhaps he was saved only by your promptness in calling me. His attack was due to an aggravated case of intestinal clogging. You’ve got to keep your baby clean inside.” The doctors then suggested the mother use Nujol to cure her baby of its “aggravated” case of constipation.83 Analax, another laxative, ran an advertisement in the November 1924 edition of Delineator in which a little girl, cuddling a puppy, gave her scrawled testimony: “I feel fine after muvver gives me Analax.”84 Another promotion in Delineator for Dr. Caldwell’s Syrup Pepsin took a direct approach with a baby picture next to the headline: “These little eyes speak volumes,” and warning, “Autointoxication is responsible for most of the ills of childhood.”85

Yeast began to be advertised as a health food in the 1920s. The discovery of vitamins and their perceived health benefits (specifically for curing constipation) made them a hot commodity in autointoxicated America. Yeast manufacturers and especially Fleischmann’s Yeast began publicizing “The New Importance of Yeast in the Diet,” extolling the virtues of A, B and D found in the “familiar foil-wrapped cake.”86 Advertisements in magazines and newspapers set off a national craze. William Stemmerman wrote that the promotion of yeast for health was “the most gigantic and widespread advertising ever done for such a purpose…Now the sale is phenomenal.”87

Fleischmann’s Yeast, or so the company advertised, mixed with intestinal waste to both soften and increase its bulk. Advertisements made a point to explain that “every cake of

84 Ad for Analax. Delineator (Nov. 1924): 94.
85 Ad for Dr. Caldwell’s Soup. Delineator (Dec. 1924): 84.
87 Stemmerman (no. 8), 199.
Fleischmann’s fresh yeast contains millions of tiny living plants,” or in other words, living yeast, whether it be Fleischmann’s or Yeast foam tablets or any other brands that made similar claims, introduced friendly microscopic life into the colon. In the public’s perception, the work of "good" bacteria as a biological agent in the intestines was not a new concept. In fact, it was a plausible extension of an already well-established idea that the key to overcoming autointoxication was to send more wholesome microorganisms into war against detrimental bacterial flora. That notion had been popularized during the first decade of the century by Elie Metchnikoff, whose work is the subject of my next chapter.

The aggressive advertising campaign for Fleischmann’s Yeast was certainly the most elaborate of all those for anti-autointoxication products. The company utilized testimonials from a wide array of people from all over the country. In one an M.D. from Boston described his battle with constipation after his return from World War I: “I was suffering from auto-intoxication…Then I began to use Fleischmann’s Yeast daily…The toxic symptoms disappeared.” A woman from Jacksonville whose system was “slowly but surely being poisoned by auto-intoxication” was aided by yeast. The legendary Kansas University basketball coach Forrest (Phog) Allen, then Athletic Director, even wrote in his testimonial: “Our football and basketball men have more ‘go’ and dash than before since we have kept them on a Yeast diet.” These testimonials show that autointoxication was widely understood and believed.

Arbuthnot Lane, always a great promoter, had gained celebrity in the United States by traveling around in 1911, performing various operations, including colectemies. Afterwards, he came back to New York and received a great ovation at an event for American surgeons. The

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89 Ad for Fleischmann’s Yeast. *NYT* (June 14, 1925): RPA7.
90 Ad for Fleischmann’s Yeast. *Literary Digest*. (Oct. 8, 1925):
organizer of the event told Lane, “You do not realize that no other man in America but [Theodore] Roosevelt would get the reception you have had here.” In 1925, Lane gave the Murphy Oration for the American College of Surgeons and was praised in *Time* magazine for not “wadding his speech with moss-bound medical verbiage,” and “explaining in plain English the concept of auto-intoxication.” Fleischmann’s took advantage of Lane’s stature in America with a series of advertisements in 1926 entitled, “Civilization’s Curse can be Conquered, Says British M.D. in Press Interviews.” Alongside a picture of the surgeon were a series of quotes from American newspapers, one describing him as a “great humanitarian.” Because of his stature as one of the most visible proponents from the medical community of the theory of autointoxication, Lane’s endorsement of Fleischmann’s Yeast instilled consumer trust. His appearance as a “famous surgeon” was also telling. His name had already been erased from the British Medical Association’s registry for his dangerous surgeries and for making too many appearances in promotional advertisements. His continued popularity in America exhibited the lasting impact of autointoxication.

The efforts of those who would discredit autointoxication were successful in the end, but references to the disease in advertisements and popular health books continued through the 1930s and even into the 1940s. For example, Phillips Milk of Magnesia had been in existence since 1880. It was not until the 1930s that their advertisements purported to “guard against auto-intoxication.” The theory of autointoxication made logical sense to American consumers who imagined themselves in a world surrounded by pernicious germs. They readily believed the

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93 “Speech.” *Time* (Dec. 7, 1925): 26. At this speech, Lane also referred to his efforts to get American newspapers to print the word “constipation.” He also claimed that he was censored from saying the word in a radio interview.
94 “Civilization’s Curse can be Conquered.” *Literary Digest* (March 1, 1928).
95 Ad for Milk of Magnesia. *The Atlanta Constitution* (Oct. 15, 1931): 15. Similar ads can be found in *NYT* and *The Atlanta Constitution* throughout the 1930s.
validity of the idea, even though it often came from non-medical persons or companies trying to turn a profit. Advertisers fed on these fears by overstating the dangerous health risks of autointoxication, and consumers bought trendy products designed to eliminate bacteria from the intestines.
CHAPTER FOUR

“THE APOSTLE OF OPTIMISM”: ELIE METchnIKOFF AND THE SOUR MILK CRAZE

I am convinced the main cause of our growing old too fast lies in the microbes within the intestinal canal... The consciousness of inevitable death, which animals have not, and which often makes man so unhappy is an evil that can be remedied, that will be remedied by science.

Elie Metchnikoff, 1909

Up-to-date doctors who tell about preventive medicines instead of keeping up a veil of mystery until the end comes prescribe Bulgarian bacillus tablets or powders and tell you how to make sour milk that will build up your shattered nerves and arrest decay. If persisted in the treatment will keep you long in the world, happy and cheerful out of passing out prematurely at 60 or 70 years, leaving relatives who try to forget you because you were crabbed and mean and a nuisance.

Kansas City Star, 1909

Dr. Simon Baruch had been a field surgeon on the staff of Robert E. Lee for the Confederate army during the Civil War, but he had never heard anything as strange as the following conversation between a soda jerk and a customer:

“If you drink that,” said the man behind the soda water counter as he handed over a glass of scientifically soured milk, “you’ll live to be two hundred years old.”

“Where’s my written guarantee?” asked the consumer with facetious intent, “and do I get my money back if I die sooner?”

The man behind the counter looked knowing. “If you want writing, there’s a plenty about sour milk. I don’t pretend to understand the theology of the subject, as you might say, for there certainly is a power of long words, but”—dubiously surveying his customer—“maybe you might know what they mean.”

“I doubt it,” sighed the other, “although possibly with patience and a dictionary.”

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3 Consequently, Simon Baruch’s son was Bernard Baruch, most famous as a financier and presidential advisor to Woodrow Wilson and John F. Kennedy.
Indeed, the “theology” behind drinking sour milk was complicated. The centuries old belief in the health benefits of curdled milk products existed in other countries, but buttermilk and products such as these had long been considered “repulsive” by Americans. According to one author, the type of soured milk being served at the beginning of the twentieth century was not very appetizing either: “If the fat hired girl had set a churnful of such stuff in the milkhouse the hired man who was waiting for her to save up the money would have resigned his position as conductor of the sulky plow and would have gone as a missionary to the South Seas.” The philosophy and scientific evidence of the usefulness of sour milk were not easily understood, but, as Baruch asserted, “the main facts are pretty big and clear, and the growing popularity of buttermilk and sour milk is so remarkable that it is worth looking into.”

The man behind the “sour milk craze” in America was Elie Metchnikoff, director of the Pasteur Institute in Paris and winner of the Nobel Prize for his discovery of phagocytes. Metchnikoff developed a unique theory of autointoxication, which incorporated his own theories of the disharmonious body and old age. His research also produced a cure: the use of the microbe Bacillus bulgaricus, which was used in souring milk and making yogurt, to combat dangerous bacteria in the large intestine. Metchnikoff’s theory and cure spread throughout America between 1905 and 1915, when fears of bacteria and autointoxication were reaching a peak.

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5 “Buttermilk.” Chicago Post via The Washington Post (Aug. 21, 1910): M3. Drinking soured milk goes back to Biblical times. Abraham set before the three angles soured and sweet milk alongside the calf which he had prepared, and Moses’ enumeration of the food given to the Israelites by God to eat included soured goat’s milk. “Leben raib,” which is the made from the milk of buffaloes, has been imbibe in Egypt and Algeria for centuries. “Ya hourth” has long been a staple of diet in the Balkans. Soured milk is consumed in great quantities by Russians in two forms, namely “prostokwacha,” which is spontaneously soured and coagulated raw milk, and “varanetz,” which is a product obtained from the souring of boiled milk and yeast. Africans have also consumed curdled milk for centuries.
7 Baruch (no. 4).
8 Metchnikoff is known to Russian historians as Il’ya Il’ich Metchnikov, to Germans as Elias Metschnikoff, and to the French and Americans as Elie Metchnikoff. His last name is also spelled Mechnikov in some sources. In my research, I found some creative spellings of his name, including Menchikov and Matschinski.
frenzy. The sale of soured milk and tablets made of Bulgarian bacillus, as it came to be known, benefited from Metchnikoff’s stature as one of the world’s foremost bacteriologists. Ironically, he never asked for nor enjoyed his fame, nor did he reap the rewards from the sale of soured milk products. According to Olga Metchnikoff’s biography, her husband was “reproached with having made money by his scientific discoveries…The fact that he left no fortunes should suffice to answer this calumny.”

Metchnikoff’s books *The Nature of Man* (1903) and *Prolongation of Life* (1907), articles in popular magazines and newspapers, and the appearance of advertisements that bore his image and name created a sensation over the health benefits of soured milk.

**Disharmonies**

Few historians have recounted the story of Elie Metchnikoff’s unusual life in the past fifty years. Many of these do not deal with the last eighteen years of his life, which seem to be an aberration. This assessment is understandable when one glances at the course of his life: from an academic career in zoology and embryology to his Nobel Prize-winning work in immunology to his ardent belief in and evangelism for the benefits of curdled milk in extending life. In his day and especially after his death, many of his contemporaries criticized Metchnikoff for his beliefs. I argue that this later period of Metchnikoff’s life was not an aberration; it was a logical

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10 A few historians have chosen to deal with Metchnikoff’s later life. Daniel Todes’ chapter on Metchnikoff in his *Darwin Without Malthus: The Struggle for Existence in Russian Evolutionary Thought* (1989) focuses on Metchnikoff’s unshakable belief in the power of science, leading him to the conclusion that science could create longer life or at least an achievement of “reduced orthobiosis.” Todes’ treatment does not really add anything to the much older *Microbe Hunters* (1925) by Paul DeKruif, a popular account of the travails of bacteriologists. DeKruif offered an interestingly detailed description of Metchnikoff’s road, explaining most of his later theories as an extension of the phagocytic theory. Leon Chernyak and Alfred Tauber wrote *Metchnikoff and the Origins of Immunology*, which is the best work to date on the conception of the phagocytic theory, but they do not deal at all with Metchnikoff’s later life. James Whorton, in his *Inner Hygiene*, covers sour milk cures in America and gives a brief summary of Metchnikoff’s achievements in this regard.
step in fulfilling his philosophy of orthobiosis (organic death) and his view of the inherent
disharmonies of the human organism. His popularity and endorsement potential came as a result
of the consumer market in America.

Born in the Ukraine in 1845 to an aristocratic family, Metchnikoff separated himself as a
Wunderkind at Kharkov University where he studied zoology and embryology. Subsequently, he
conducted research in those subjects at institutions throughout Europe and finally settled at
Novorossisk University in Odessa where he held an appointment for twelve years. Despite
professional success, Metchnikoff was not happy. His pessimism and dark mood permeated
several essays of the 1870s in which he emphasized the fundamental “disharmonies” that
afflicted human nature—that is, the contradictions within the human organism as well as those
between it, nature and society.\textsuperscript{11} In “The Age of Marriage” (1871) Metchnikoff identified a
basic disharmony between the age at which individuals first experience sexual urges and that at
which they attain the social maturity necessary for marital life.\textsuperscript{12} In “The Struggle for Existence
in a Broad Sense” (1878) he observed that conflict did not favor “the higher representatives of
mankind,” but, rather, primitive or practical men unrestrained by moral considerations.\textsuperscript{13}

Metchnikoff attempted suicide at least twice between 1873 and 1881. In 1873 his first
wife died after a long illness. Distraught over his loss and convinced that the gradual failure of
his eyesight would end his scientific career, he overdosed on morphine but vomited in time to
save his life. His later account of this experience was related by his second wife Olga in her

\textsuperscript{11} These disharmonies have been pointed out in the work of historians who have previously dealt with Metchnikoff,
including Daniel P. Todes, Tauber and Chernyak, and Kiril Rossianov in his unpublished paper tentatively titled
“Taming the Primitive.” See also: Scott H. Podolsky. “Cultural Divergence.” \textit{Bulletin of the History of Medicine} 72:
1 (1998): 1-27. In this article, Podolsky gives an analysis of the British and American rejection of Metchnikoff’s
theory of the disharmonious organism. Before Metchnikoff, the conception of man as a perfect machine had been
well established.

\textsuperscript{12} Leon Chernyak and Alfred Tauber. \textit{Metchnikoff and the Origins of Immunology}. (New York: Oxford University
Press, 1991), 182. This theme was also discussed by Metchnikoff in \textit{Nature of Man} (1903): 78-112.

adoring biography. Metchnikoff’s 1881 suicide attempt was less conventional, but it provided the first sign of a growing interest in bacteriology. This time, he coordinated his suicide attempt with an experiment to test the validity of Pasteur’s germ theory. To prove that bacteria could cause fatal disease in humans, Metchnikoff resolved to infect himself with the blood of a patient dying from fever. He scratched the patient’s arm and his own arm, and then rubbed the patient’s infected blood into his own wound. The experiment was a success; Metchnikoff caught the fever. His suicide attempt was, however, a failure for after a painful illness, he recovered.

In 1882 at the age of thirty-eight, Metchnikoff faced a dilemma. Adding to his fatalistic attitude toward life, he was troubled by student unrest that swept through the Ukraine after the assassination of Tsar Alexander II, and he was also unhappy about a lack of funding for his research. His decision to leave his homeland was made easier by the inheritance his wife received after the death of her father. Financially independent, Metchnikoff resigned his faculty position and left for Messina, Italy, to continue his research on digestion in lower animals.

The following year, Metchnikoff made his greatest scientific discovery. One morning, he was alone at his house in Messina while his wife and children were away at the circus. The night before, Metchnikoff had introduced a thorn under a starfish larvae’s skin, which is transparent, in order to find a link between digestive cells and cells that cause inflammation. The next day he observed “mobile” cells from the mesoderm surrounding the thorn in an attempt to devour it, causing inflammation to occur. Metchnikoff named these attacking cells phagocytes, or literally eating cells.

14 Olga Metchnikoff (no. 9), 80-81.
16 This story is recounted by Elie Metchnikoff in Nature of Man, Olga Metchnikoff and Paul DeKruif. Though these accounts are perhaps romanticized, one has to take them at face value because no historian in the past 50 years has tackled a full biography of Metchnikoff.
Metchnikoff’s phagocytic theory included three basic components: inflammation is a therapeutic, not pathological phenomenon; inflammation is a reflection of the inner struggle between phagocytes and a foreign invader; and inflammation is but one stage in an evolutionary continuum that includes all host-parasite relationships, including those in humans. In this way, Metchnikoff wrote, the struggle between host and bacteria was much like Darwin’s struggle for existence among animals. The phagocytic theory was the first to propose an active host resistance to infection, and the first theory of active immunity, opening “a metaphysical space for the study of activities responsible for organismic integrity.” For Metchnikoff personally, phagocytes provided an answer to the question of the future quality of human life and led him into an extended period of optimism. He would never again attempt suicide.

Part of the change in attitude certainly had to do with professional success that resulted from his discovery. After being rejected by the Russian bacteriological community in 1887, Metchnikoff decided he would find a permanent home in Western Europe. He was greeted indifferently by Robert Koch in Germany, but Louis Pasteur viewed the phagocytic theory as a potential explanation for the function of immunity and offered Metchnikoff a laboratory at his newly founded institute. Metchnikoff moved to Paris in 1888 and remained there for the remainder of his life, becoming director after Pasteur’s death in 1897. He was elected to the French Academy of Sciences in 1904, and in 1908 shared the Nobel Prize in Physiology or Medicine with Paul Ehrlich.

The phagocytic theory itself proved to be a vehicle for Metchnikoff’s transformation from pessimist to optimist. At the age of 54, he was concerned with his apparent premature

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18 Chernyak and Tauber (no. 12), 182.
Anxiety over aging and approaching mortality comes to everyone who lives long enough, but while most people accept fear of death as a natural reaction, Metchnikoff regarded it as an unnatural disharmony. Pessimism in general, he concluded, originated in the inevitability of physical and mental decay in old age and the impossibility of attaining an “orthobiotic” death or one which coincided with the extinction of the life instinct. People never felt that they had had enough of youth, or looked forward to the restfulness of decrepitude. “Our inmost convictions assure us that life is too short,” Metchnikoff observed, and that seemed proof that we are not living long enough, that we are falling short of the life span intended by nature.

In a published lecture entitled “Old Age,” Metchnikoff cited Western civilization’s intolerance of the aged: “Incapable of any useful work in the family or the community, old people are considered a heavy charge, and though we have no right to make way with them, we desire, nevertheless, their final departure, and are impatient at its long delay.” He cited statistics that showed that, on average, suicide by the elderly is more prevalent. These suicides were not a result of a craving for death but of the general disappointment with their health and ineffectiveness in society. “The desire to live,” Metchnikoff asserted, “instead of diminishing tends, on the contrary, to increase with age.”

Metchnikoff wrote enthusiastically of the positive social consequences of scientific progress in the prolongation of human life. Life extension and especially the elimination of senility and weakness of old age would result in “a great leveling of human fortunes,” and

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19 According to one Stephen MacKenna who interviewed Metchnikoff at age 54 and a half, the scientist looked “a good ten years older.” Metchnikoff himself called his age “very old.” Stephen McKenna. “Dr. Metchnikoff as he is in His Paris Home.” The Atlanta Constitution (Feb. 18, 1900): 22.
22 According to Metchnikoff, the “young and strong” represented 36.5% of all suicides, while the aged amounted to 63.5%.
23 Ibid., 535.
provide the basis for the solution to all social problems.\textsuperscript{24} Science, and not “childish and erroneous” religious conceptions and various idealist philosophies, would lead to a society where vigorous and experienced old men would run human affairs, thus avoiding the problems caused by young and impetuous leaders.\textsuperscript{25} Responding emphatically to complaints by metaphysical philosophers of the “bankruptcy of science,” Metchnikoff stated at the Twelfth International Congress of Physicians in 1897 that people “must be persuaded that science is all-powerful.”\textsuperscript{26} Only science could provide a sound basis for optimism about life, and a prescription for holding old age at arm’s length until nature was ready to accept it.

\textbf{A Singular Theory of Autointoxication}

After studying the works of Charles Bouchard, Arbuthnot Lane, and through his own research, Metchnikoff concluded that premature deterioration resulted from the conquest of healthy organic elements by the harmful microbes that flourished in the large intestine. He agreed with Lane that the body aged prematurely because physical evolution worked too slowly to keep pace with cultural evolution. The disproportion was apparent, he elaborated, in the continued existence of organs that had been critical for survival at an early stage of humanity’s climb up from the animal kingdom, but were useless, even harmful, in the advanced state of civilization. The vermiform appendix was one example of an obsolete and dangerous organ, the wisdom teeth another.

\textsuperscript{24} \textit{Nature of Man} (no. 20), 228.
\textsuperscript{25} While he never cites him, Metchnikoff seemed to echo the sentiments of Nicholas Fyodorov (1828-1903), a Russian philosopher who centered his criticism of positivist displacement of the old by the young. He pointed out that positivist social thought assumed youth to be more advanced simply because “progress” presumably had been made, and, therefore, those appearing on the scene at a later time must be superior. For Fyodorov, it was unjust for the child to seize supremacy over the parent; he noted that Judeo-Christian dictated that the son serve the father.
\textsuperscript{26} \textit{Nature of Man} (no. 20), 300.
The colon was a third, and indeed it was, more than any other organ, one of the body’s “useless inheritances,” a sack that was “superfluous.”\textsuperscript{27} It had outlived its evolutionary survival value. Metchnikoff noted that the colon was developed only in mammals, which frequently have to move about quickly on the ground. Having to abruptly halt pursuit or flight in order to evacuate the bowel can cause an animal to miss a meal, or to become one. The colon had evolved as a storage bin to hold feces until a convenient time for disposal. For urbanized humans, however, a large fecal reservoir was of no more advantage than body hair—“Man does not secure his prey or escape from his enemies by the rapidity of his locomotion.”\textsuperscript{28} Like hair, which collected microbes and could sometimes become sites for infection, the colon contained germs, and these were constantly inciting putrefaction of waste. From putrefaction, came autointoxication. The large intestine was not just “an asylum for harmful microbes,” but “the source of many poisons harmful to the body, a source of intoxication from within.”\textsuperscript{29}

Metchnikoff had a singular view of autointoxication’s role in death because he combined preexisting theories with his own of phagocytosis. In his second work on the subject \textit{Prolongation of Life} (1907), he asserted the belief that autointoxication caused senility in old age. He first put forth the assertion that “in senescence the most active factor is some alteration in the higher cells of the body, accompanied by a destruction of these by macrophags \textit{sic} which gradually usurp the places of the higher elements and replace them by fibrous tissue.”\textsuperscript{30} He reasoned that the large intestine served as the principal site of entry of the body’s bacteria. These microbes secreted toxins that alter higher cells of the body, and senescence occurred when phagocytes destroyed altered cells. Metchnikoff hypothesized a direct negative correlation

\textsuperscript{27} Ibid., 329.  
\textsuperscript{28} Ibid., 76.  
\textsuperscript{29} Ibid., 252.  
between the size of a species’ large intestines and their average life span, and he reported the intestinal capacities and life spans of various mammals which verified his theory. In this way, Metchnikoff again displayed the fundamental disharmonies of organisms, with the inner body continually working against itself.

For Metchnikoff, the easiest way to eliminate the problematic colon was to remove it by surgical means. Even before Lane’s operation became popular among autointoxicated upper classes, a few people had had their colons surgically removed and had continued to live comfortably enough afterwards. To Metchnikoff, they were walking proof of his theory that the large intestine “is certainly useless in the case of man.” They were proof that evolution could be accelerated. However, even when done by Lane, colectomy was a high-risk procedure and an expensive one, so it was not a universal answer to the problem of the superfluous colon. Metchnikoff did not believe that surgery was necessary since the problem was not the organ itself, but the harmful bacteria that lived inside of it. His solution: to make allies out of bacteria.

*Bacillus Bulgaricus*

Metchnikoff had some experience with the transformation of intestinal flora. During the cholera epidemic of 1892, he had built upon the ideas of Max von Pettenkofer (1818-1901), who had argued earlier that the environment in which a germ settled was as critical as the pathogen

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31 Ibid., 47-58.
32 When Lane became known for his removals of the colon, Metchnikoff saw in him a kindred spirit. The two corresponded, and when professional travel brought them to London in 1904, the bacteriologist paid a surprise visit to the surgeon. Communication continued after Metchnikoff returned home, and around 1907 he began sending two of his research assistants to London for six weeks every year to study Lane’s surgical cases and confirm that the colon was unnecessary. One of these, a Dr. Distaso, “was careless in that he continually left the excised intestine in a bus or train, and had great difficulty in regaining possession of it.” From: Thomas Bramley Layton. *Sir William Arbuthnot Lane: An Enquiry into the Mind of a Surgeon.* (Edinburgh: Livingstone, 1956): 89-94. See also: Ann Dally. *Fantasy Surgery, 1880-1930.* (Atlanta: Rodopi, 1996).
33 *Prolongation* (no. 30), 151.
itself in the determination of infectious disease. Metchnikoff repeated von Pettenkofer’s bold experiment of swallowing a culture containing the cholera bacillus and failing to contract the illness. One laboratory assistant obtained a similar result, but when another nearly died from the experiment, Metchnikoff was forced to consider the factors responsible for the scientists’ different immunity to the cholera microbe. In vitro experiments showed that certain microbes inhibited the growth of cholera, while others improved its growth. Metchnikoff proposed that the interference of the different floras in the subjects’ digestive tracts with the growth of cholera determined immunity. Thus, there was the possibility in the context of putrefaction and autointoxication that if “friendly” microbes could be orally ingested, a subsequent struggle for existence in the large intestine could result in the replacement of the noxious putrefactive flora.34

Unlike most animal products, milk does not readily putrefy. Rather than rotting, it turns sour due to the action of microorganisms that degrade lactose (milk sugar) into lactic acid. Lactic acid, Metchnikoff posited, must inhibit the activity of putrefactive bacteria, so it followed that if lactic acid-producing microbes were introduced into the colon, autointoxication might be arrested. In sum, “the means by which pathological symptoms may be removed from old age, and by which, in all probability, the duration of the life of man may be considerably increased,” he concluded, was by transforming “the ‘wild’ population of the intestine into a cultured population.”35

The most cultured of all populations, in this sense, was Bacillus bulgaricus, or in modern terminology Lactobacillus bulgaricus, soon to be renowned throughout the Western world as the Bulgarian bacillus. It was the organism responsible for producing yogurt, and though other soured milk preparations (kefir and koumiss, for example) contained lactic acid-generating

34 Podolsky (no. 11), 6.
35 Prolongation (no. 30), 255-257.
bacilli, Bulgarian bacilli seemed to Metchnikoff to be the best at defeating the bacteria that caused autointoxication. It was not just that laboratory tests identified *B. bulgaricus* as the most active producer of lactic acid; more compelling was the fact that yogurt and sour milk were consumed in large quantities by the inhabitants of Bulgaria, as well as those of Georgia and other regions of Metchnikoff’s native Russian Empire. These territories were renowned for producing people of extraordinary age. It was thus logical to conclude that *B. bacillus* microbes “must exercise favorable influence in favor of longevity.” It was also evident that these germs could bring the human organism closer to resolving its inherent disharmonies.

Metchnikoff introduced his revolutionary ideas to the world in a lecture delivered in Manchester in 1901, then expanded upon them at length in his two books *Nature of Man* and *Prolongation of Life*, both of which were translated into English by P. Chalmers Mitchell. The unbridled optimism expressed in these books naturally inspired jests about “the modern Ponce de Leon” who searched “for the Fountain of Immortal Youth and [found] it in the Milky Whey.” However, it was not milk or whey or even yogurt that Metchnikoff proposed as the best preservative of youth and defendant against autointoxication. Those concoctions were still rife with alien microbes besides the *Bacillus bulgaricus* that could interfere with the effects of the healthful germs. Metchnikoff endorsed a process of sterilizing milk and then inoculating it with

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36 In an interview with Herman Bernstein for the *New York Times*, Metchnikoff said he had funded his research at the Pasteur Institute with the money ($40 million francs) a Jewish banker named Osiris left when he died. Herman Berstein. “Metchnikoff—The Apostle of Optimism—On the Science of Living.” *NYT* (Aug. 1, 1909): SM4.
37 Metchnikoff was, in fact, adamant that “the conception…of a harmonious activity of all the organs, is no longer appropriate to mankind.” Though he had high hopes for *b. bacillus*, he also acknowledged, “I am so little convinced of the existence of any disposition of nature to transform our ills into goods, and our disharmonies into harmonies, that it would not surprise me if such an ideal were never reached.” Metchnikoff. *Prolongation*. 334-335.
38 The original title of *Prolongation of Life* was simply *Eassais optimists* or “optimistic essays.” This original title became the subtitle when the English language version was distributed in America. The title *Prolongation of Life* was given because it gave the book more public appeal, and this subject was what Metchnikoff had become known for. On this subject Metchnikoff said, “It seems to me that Americans are rather fond of sensationalism even in their sciences. When my volume ‘Studies on Optimism’ appeared in English, it was called ‘The Prolongation of Life.’ I cannot understand why the title should have been changed.” From Bernstein (no. 40).
a pure culture of the Bulgarian bacillus. Sterile, sweetened vegetable broth worked equally well as the vehicle, and it was even possible to dry the Bulgarian culture and use it in the form of powder or tablets. Metchnikoff’s preference was for liquid culture prepared by a Paris firm and sold in small vials under the name Lacto Bacilline, taken straight or added to boiled milk to make yoghurt. He was so convinced that his health had benefited from his bacterium, he persuaded his friends to adopt the product too, and, his scientific standing being what it was, before long Paris physicians were prescribing the sour milk regimen for patients.

Patients began prescribing themselves even more eagerly. Metchnikoff’s remedy became a phenomenon not just in Paris but also in England. The good news was widely broadcast in Europe. Punch’s epic tale of “Brixton’s Brave Bacterium” shows that as early as 1908 the English public was aware of the new French remedy. In the story, a young man of London’s Brixton neighborhood awoke one morning to discover “that his interior was being violently disturbed by a gang [of germs] who are believed to have affected an entrance under cover of a pork pie of more than usual indigestibility.” The boy was soon reduced to the brink of death but was saved by “the vigilance and courage of a lactic acid bacterium, who had concealed himself on the premises in some curdled milk.” There had been “a desperate struggle,” but “the intruders were eventually overcome, and the bacterial benefactor, with characteristic modesty, withdrew without leaving either name or address.”

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41 The reason why Metchnikoff preferred this Paris firm was that he had a personal connection to it. The entrepreneurs behind the firm asked Metchnikoff to recommend someone who could carry out his unique process of making sour milk with *B. bulgaricus*. As Olga recounted, her husband trained a young scientist in whom he had a personal interest (Metchnikoff was godfather to this man’s child) specifically for the work at Lacto Bacilline. When the entrepreneur sought out Metchnikoff’s personal endorsement to help sell the product, the scientist consented and the young man’s future was assured. From: Olga Metchnikoff (no. 7), 226-227.

42 Olga Metchnikoff (no. 9), 228.


44 Ibid., 344.
European physicians were receptive of the Bulgarian bacillus. In 1907, Adolphe Combe, a Swiss pediatrician, issued a 400-page treatise advocating the “antiputrefactive regimen” for all manner of ailments.\textsuperscript{45} The following year, a Glasgow MD proposed to the readers of The Lancet, Britain’s most prestigious medical journal, that Thomas Parr, the seventeenth century centenarian, had achieved such length of days because of the sour whey he was reputed to have consumed each day. Lactic acid, he suggested, should be considered as “nature’s own intestinal germicide.”\textsuperscript{46} The British Medical Journal reiterated the point, suggesting that “fighting harmful microbes with other microbes opens up great possibilities, and is in accordance with…the methods of Nature.”\textsuperscript{47} In 1908, noted London gastroenterologist George Herschell (1856-1914) devoted a short book to Soured Milk and Pure Cultures of Lactic Acid Bacilli in the Treatment of Disease.\textsuperscript{48} In it the author hailed Metchnikoff’s work as a “brilliant conception” for combating autointoxication. Soured Milk’s first run of 8000 copies sold out in just 6 months, necessitating a considerably enlarged second edition issued later that year.\textsuperscript{49}

British physicians were bemused by the growing popularity of the treatment. “Curdled milk is the fashion of the moment,” a Scottish physician commented.\textsuperscript{50} One British medical commentator recalled in the Journal of the American Medical Association that at the time, “one heard of nothing but the Bulgarian bacillus. The bacillus shared with Mr. Lloyd George’s budget the honor of monopolizing the conversation at the dinner tables of the great. He dominated Belgravia, frolicked in Fulham, and bestrode Birmingham and the whole of the British Isles.”\textsuperscript{51} He went on to say that his patients were beginning to believe that “all their diseases were

\textsuperscript{46} D. Fraser Harris. “Longevity and the Milk Diet of ‘Old Parr.’” Lancet (1908): 1399.
\textsuperscript{47} “A Modern Elixir of Life.” British Medical Journal ii (1908): 847-849; pg. 847.
\textsuperscript{49} In all, Herschell’s book went through 6 editions: 1908 (2), 1909 (2), 1910, and 1911.
\textsuperscript{50} A. Brown. “Some Notes on ‘Curdled Milk.’” The Lancet (1910): 49-60; pg. 49.
\textsuperscript{51} “Metchnikoff and Buttermilk.” JAMA 67 (1916): 939.
curable” by lactic acid and that one had recently informed him “that doctors would soon be a thing of the past...because sour milk was all-sufficient.”

The Sour Milk Craze in America

Professional interest in America matched that of Europe. Some American bacteriologists tended to turn a more incredulous eye towards the lactic acid craze. In 1909, P.G. Heinemann and Mary Hefferan from the Bacteriological Laboratory of the University of Chicago had demonstrated that Metchnikoff and his followers were wrong in the belief that the Bulgarian bacillus could establish itself as the chief component of the colonic flora. Their results indicated that *B. bulgaricus* was an “ordinary habitant of the intestinal tract, and its presence after [drinking soured milk] is not necessarily a proof of its permanent acclimatization there in large numbers.” Others, however, asserted the beneficial qualities of Bulgarian bacillus. In 1910 R.T. Hewlett, a bacteriologist contributing to *Nature*, wrote, “It can hardly be doubted that [Bulgarian bacillus] is beneficial in...acute enteritis, chronic colitis, autointoxication...forms of anemia, neurasthenia...headache, constipation and diarrhea.” The latter message was the one most relayed to and accepted by the American public.

The sour milk treatment appealed immediately to American consumers. Even before Metchnikoff won the Nobel Prize (1908), his reputation preceded him as a famous bacteriologist and director of the Pasteur Institute. Readers of *The Atlanta Constitution* were introduced

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52 Ibid. According to Podolsky (no. 11), Metchnikoff’s theories were discounted in Britain because they conflicted with the traditional views of the harmonious human organism
personally to Metchnikoff by a 1900 interview with Stephen MacKenna.\textsuperscript{55} In this piece and others, Metchnikoff was depicted as a scientist with a romantic obsession with the search for the “elixir of life.” He was willing to admit that he did not have “the faintest hope of being able to prolong [his] own life by a single day;” however, “each succeeding generation will get closer to the solution and…true happiness will by reached by mankind.”\textsuperscript{56} In one story, he was inspired by Pasteur himself:

When Pasteur, at sixty-six, entered the great institution which bears his name, he cried in poignant sorrow that he was a man vanquished by age. What impression this incident made upon the mind of his disciple and successor, Elie Metchnikoff, is at least partly indicated in the latter’s devotion to the search for serums with which to prolong the ‘prime’ of life.\textsuperscript{57}

Others depicted Metchnikoff as something of a Dr. Frankenstein, looking to extend life by any means necessary. In a story in \textit{McClure’s Magazine}, it was revealed that Metchnikoff had been working with a Dr. Belonovsky of St. Petersburg to create reinforced blood by passing human blood through a horse. By this method, it was reported, they could also develop a “brain serum,” a “heart serum” and a “liver serum.”\textsuperscript{58}

Metchnikoff’s actual remedy revealed a side of bacteriology that was not as familiar to Americans: the concept of “good bacteria.” As one writer in \textit{Time} magazine recalled, “A half century of living under the tutelage of Pasteur and his successors has taught us that most disease is caused by ‘deadly’ bacteria and has inspired a healthy fear of the teeming microbe world.”\textsuperscript{59} However, previous bacteriologists had covered the subject of good germs. Hebert William Conn, a leading American bacteriologist, promoted bottling and selling bacteria for the purposes

\textsuperscript{55} MacKenna (no. 19). MacKenna was a scholar of the ancient Greek philosopher Plotinus.
\textsuperscript{56} Ibid.
of sweetening dairy products. At this time, the uses of bacteria in agriculture were just being discovered and announced around the country. Other articles revealed that bacteria were responsible for the variation in the flavors of cheese, wine and tobacco.

Minds eased with regard to the usefulness of bacteria with a two-page article in the *New York Times* by Metchnikoff himself entitled “Microbes, Our Enemies and Friends.” This piece covered the use of Bulgarian bacillus only briefly, but it did display a need for the issue to be clarified. More importantly, Metchnikoff’s search for the cure for old age captivated the imagination of the public. Progressivism’s belief in the progress of science seemed to be confirmed in the prospect of living to the age of 100 without ever feeling old. Samuel Fellows, an Episcopal bishop from Chicago and founder of Christian Psychology, cited Metchnikoff in recommending the use of sour milk: “If the lives of the present generation could be prolonged to beyond 100, it might be thought that history would change more rapidly than in the previous six generations of men, both heroes and common people, cut off in their age of usefulness.”

The first appearance of Metchnikoff’s name in a print advertisement was in 1907 for Duffy’s Pure Malt Whiskey, entitled “Old in Years but Young in Spirits Owing to the Constant

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Use of Duffy’s Pure Malt Whiskey.”65 The ad pictured four old men running a race above the endorsement, “Metchnikoff, the eminent Russian scientist, after a life of research and scientific study, says that we can successfully combat old age.”66

Curiously, Metchnikoff’s name did not appear in other ads between the years 1907 and 1915. However, there is abundant evidence that the popularity of drinking sour milk for health was growing, and manufacturers all over the country were making a profit from the new therapeutic. A report out of Pittsburg stated that manufacturers of sour milk were “taking advantage of the lack of competition and thus making a wholesome food a fancy product. A pint of sour milk is sold for 25 cents...Nothing can justify this high price, and it is desirable to see this wholesome product put within the reach of every purse.”67 In 1907, a controversy in Chicago erupted about the quality of buttermilk made by adding lactic bacteria to skimmed milk.68 Nevertheless, for Christmas of 1909, Chicagoans enjoyed bonbons containing lactic acid product surrounded by a sweetened chocolate coating that assisted lactic acid fermentation.69 A writer for the Houston Post marveled:

The fashionable craze of the moment is neither rinking or aviation, but the drinking of sour milk or the munching of specially prepared tablets, charged with sour milk bacteria...Every chemist shop is full of sour milk lozenges and chocolates. Every careful wife is urging her husband to drink specially prepared Metchnikoff milk that is sold by the leading dairy companies at a fabulous price. Cooks have a fresh burden added to their lives by being asked to prepare sour milk at home, a process taking many hours and much careful regulation of temperature. Meanwhile the folk to whom an expenditure of from $2 to $5 a head for specially prepared sour milk is impossible can obtain the same result by drinking the once despised buttermilk.70

65 Ad for Duffy’s Pure Malt Whiskey. The Atlanta Constitution (June 16, 1907): C3.
66 Ibid. This ad ran continuously for two months.
68 “Chicagoans and ‘Buttermilk.’” NYT (Nov. 30, 1907): 6. See also: “Buttermilk” (no. 3).
In Washington, D.C., Dr. C.F. Langworthy, chief of the Division of Nutritional Investigations, took an interest in sour milk: “There can be little doubt of the definite value of the use of the bacillus Bulgaricus...As the taste for sour milk increases generally in the community the consumption among the lower classes will in all probability be very considerable.”

Interest in sour milk was especially high in New York City. At least three large manufacturers of Bulgarian Bacillus products were established in the city between 1907 and 1910. According to Dr. Baruch, these larger firms sold from 120,000 to 125,000 quarts of milk infused with \textit{B. bulgaricus} per week; smaller firms sold between 20,000 and 80,000 quarts per week.\footnote{Baruch (no. 4).} One of these firms, The Lacto-Bacilline Company of New York, responded to the anticipation of the publication of \textit{Prolongation of Life} by issuing excerpts from the book in a pamphlet entitled \textit{Scientifically Soured Milk}.\footnote{Elie Metchnikoff. \textit{Scientifically Soured Milk: Its Influence in Arresting Intestinal Putrefaction and Its Action in the Treatment of Diseases Caused By Auto-Intoxication}. (New York: The Lacto-Bacilline Company of New York, 1907).} This document, which was sold to New York doctors and interested public, explained the theory and method behind Bulgarian bacillus. Another pamphlet was issued by The Franco-American Ferment Company in 1909, which announced their Lactobacilline—S. as “the approved suspension of lactic acid bacilli for topical applications.”\footnote{Lactobacilline—S. (New York: The Franco-American Ferment Co., 1909). This pamphlet featured a picture and the signature of Metchnikoff, along with a long description of his research.} The company purported Lactobacilline—S. to be an effective disinfectant and sedative in the treatment of a number of skin diseases, as well as inflammatory conditions of the nose, throat, mouth and gums. The Metchnikoff Laboratories of America ran an article in the \textit{New York Times}, reporting “The Truth About Lactic Bacilli Tablets.”\footnote{“The Truth About Lactic Acid Bacilli Tablets.” \textit{New York Times} (Jan. 16, 1916): 2.} Essentially a response to a negative editorial to the paper concerning the benefits of Bulgarian bacillus products, the

\footnote{Dr. Albert Wiley. “Studying to Prolong the Life of Man: Metchnikoff’s Theory of Sour Milk as a Panacea Attracts Attention of Government Experts.” \textit{NYT} (Jan. 2, 1910): SM11.}
company also revealed that they did “not advertise [their] products in the public press, but prepare a lactic bacilli dry tablet…which [they] would be glad to send to any applicant who doubts its efficacy.”

Writing in the *Brooklyn Eagle*, traveler and writer Julius Chambers claimed to have a friend whose craving for soured milk equaled that of a drunk for alcohol. Another writer posited that the “increased consumption of clabber would limit the consumption of beer and other alcoholics.” Indeed, drinking sour milk in America had become a form of conspicuous consumption, to “show one’s self up-to-date, well informed as to the recent discoveries of science.”

By 1915, support by the medical community for Bulgarian bacillus had waned considerably. Alfred H. Rahe from the Department of Hygiene at Cornell proved what Heinemann and Heferran had previously postulated: *B. bulgaricus* could not survive in the large intestine. Leo Rettger, along with his colleague Harry Cheplin, sought to establish themselves in the field of bacillus therapy. Citing Rahe’s study, they proposed a new bacterium to replace Metchnikoff’s: *Lactobacillus acidophilus*, a close evolutionary relation to *B. bulgaricus*. In a series of articles and books from 1915 to 1921, Rettger and Chaplin established *Lactobacillus acidophilus* as the new “it” cure. A 1915 article declared Bulgarian bacillus out of date, and Rettger graced the cover of *Time* magazine in 1925 for his discovery.

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76 Ibid.
77 Julius Chambers. “Buttermilk Elixir of Life: One Man’s Craving for It Equals That for Alcoholic Drink.” *Brooklyn Eagle* via *The Washington Post* (June 15, 1908): 6. Chambers thought Metchnikoff was selling sour milk himself: “Naturally, the thrifty Parisian professor turns his opinion to financial accounts by compressing curds into tablets and putting the product upon the market at a high price.”
78 Baruch (no. 4).
79 Ibid.
Ironically, 1915 was the year Intesti-Fermin Tablets began advertising their products in the *New York Times*. The first ad pictured Metchnikoff behind a microscope and confidently stated that “a new means of securing better health and lengthened years of life is now obtainable in America in convenient tablet form.” The tablets were purported to cure all of the ills of autointoxication, including “headache, biliousness, constipation, arterio-sclerosis, nervous disorders and the petty ailments of advancing years, including premature old age itself.” These ads were short lived, as two events brought the soured milk industry to a halt.

As America entered World War I, consumers became suddenly unconcerned with the health of their colons. Metchnikoff’s death in 1916 also hurt the status of his bacterium. An article entitled “An Ironic Touch” echoed what many may have been thinking: “That Prof. Metchnikoff should have lived to the age of only 71 is not finally corroborative of his theories.” Kellogg was especially critical of Metchnikoff for his “young” death. In a chapter entitled “Metchnikoff’s Mistake” in his *Auto-Intoxication or Intestinal Toxemia* (1919), Kellogg scolded Metchnikoff for continuing to eat meat and supporting a “false” theory to the public.

Despite Metchnikoff’s critics, his legacy lived on well after his death in print advertising. Chestnut Farms Buttermilk quoted Metchnikoff in 1921—“‘set a thief to catch a thief’”—to sell its product. Glyco-Pepto Milk, a product of Borden’s Farm that contained Bulgarian bacillus, was available at drugstores or as a fountain drink in 1922. It warned consumers not to confuse it...

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86 In all, there were only 4 ads (April 29, May 5, May 20, and May 23).
with buttermilks or “old-fashioned Bulgarian milks sold in colored bottles. Glyco-Pepto Milk is prepared fresh each day and sold only in clear glass bottles.”

An ad for Dr. Spieker’s Bulgarian Yoghurt, which was manufactured by Sheffield Farms, reassured consumers as to the validity of Metchnikoff’s theory:

When Metchnikoff gave to the world the results of his investigations, fermented milk enjoyed tremendous vogue. Sour milks of every kind and quality were offered. Every part of the world was making fermented milk. And then came a lull in the enthusiasm. Consumers had been disappointed. The theories of Metchnikoff were discredited. A nine days’ craze had appeared and faded. But Metchnikoff was right. The trouble lay in the fact that the cultures used in fermenting the products sold were not the kind that Metchnikoff had discovered and used in his experiments. The genuine Bacillus Bulgaricus alone can give the results he observed and the vendors of fermented milks either didn’t know this or didn’t care, and lost the confidence of the medical profession.

Ads for Cultur-Lac, which featured a picture of Metchnikoff and his microscope, recommended itself as an antiseptic for cuts, burns, bites, ulcers and any open sores. Metchnikoff’s image was even used to sell milk containing *Lactobacillus Acidophilus*. In a full-page promotion for Walker-Gordon Acidophilus Milk, another product of Borden’s Farm, Metchnikoff smiled out from behind his desk under the title: “NOW YOU CAN RENEW THE YOUTH OF YOUR DIGESTION.”

Doorstop delivery service was available at the customer’s request.

Initial support from the medical community and enthusiasm by the public gave the sour milk treatment cultural momentum that made it and the name Metchnikoff successful into the 1930s. Consumers still found reasons to buy varieties of sour milk products even after Bulgarian bacillus’ usefulness was discounted and Metchnikoff died younger than expected. The cult of

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90 Ad for Glyco-Pepto Milk. *NYT* (April 19): 40; (April 25): 12. These ads also informed consumers which fountains and drug stores had the milk on tap.


youth and the cult of science were both strong in America at the turn of the century, and Metchnikoff’s theory of old age was a perfect marriage of the two fascinations.

In addition, Metchnikoff’s utilization of bacteria for the good of mankind confirmed the Progressive and Positivist belief that scientific and technological progress could drive social progress. Americans had struggled in their newest battle against Nature, but in the end they had learned from Metchnikoff that bacteria could be turned against each other in a struggle for existence in their large intestines. In this way, man could essentially outsmart and even tame their tiniest foes and avoid not only the perils of auto-intoxication but the disease of old age as well. The societal burden of an incapacitated elderly population would no longer be a problem. In Metchnikoff—“the apostle of optimism”—Americans found, at least for a time, their savior.
CONCLUSION

THE RETURN OF SOME “OLD” IDEAS

The process of disseminating information from the bacteriological revolution involved mutual dependencies between medical scientists and physicians, consumers of science, and the consumer market itself. In a sense, bacteriologists created a monster. By finding the cause of infectious disease, they created an atmosphere where any scientific discovery, whether valid or not, was seized upon by a public eager for information from their new cultural heroes. Germ fears, as well as misinformation and misunderstandings, became powerful tools for advertising firms to sell products meant to either assuage fears or cure diseases.

More importantly, the bacteriological and consumer revolutions of the past century and a half reveal the roots of many contemporary trends in American culture with relation to science and medicine. Germ fears and autointoxication stood on a continuum of traditional ideas about diseases and their treatment. On a conceptual level, bacteriology made real the disease demons that had previously existed in the supernatural world, and health writers and the public responded according to a metaphorical understanding of bacteria as malicious beings that actively hunted and killed humans. These fears were behind some irrational actions and views of scientists and non-scientists alike.

Although the germ paranoia of early twentieth century may be gone, concerns about personal and household hygiene largely remain. Indeed, an obsessive concern with cleanliness continues to be one of the more remarkable traits of Americans. Advertisements, articles and books urge us to keep ourselves essentially aseptic and odorless, and he or she who smells of
once considered normal human odors is possibly unhealthy or at least strange. Hygienic products that began at the turn of the century, including Kleenex, Lysol and Listerine, have kept American consumers from letting their guard down.

If advertising is a reflection of the current state of public opinion on health issues, the public’s concern for hygiene is almost as great as it was sixty years ago. According to a study by Allison E. Aiello and Elaine L. Larson, both medical sociologists, the percentage of hygiene ads in magazines such as *Ladies Home Journal* and *Good Housekeeping* has actually increased since 1975, almost to the levels reached in 1940.¹ Interestingly, the number of advertising claims for microbial effects went down during these years, indicating a steady decrease in concern for bacteria themselves.² However, claims for health effects rose, as did ads for personal hygiene and cleaning purposes. While Aiello and Larson attribute this increase in concern for hygiene to the reemergence of fears of infectious diseases created by the AIDS crisis, one can extrapolate an interesting trend from their study: American consumers’ fear of bacteria has decreased, while general concern for health via hygienic measures has increased. Today people buy antibacterial cleansers and sanitizers in large quantities without a pathological fear of bacteria.³ Essentially, our cleanliness habits have remained similar to those at the turn of the twentieth century, but we have lost touch with why we are so obsessed with hygiene.

Autointoxication fell out of common usage as a word by mid-century. “Auto-intoxication,” “toxic absorption,” “colonic stasis”—all “are bugaboos,” an American physician

² Ibid. The number of microbial effects claims dropped from 14.8 to 12.4 percent, but the number of claims for health effects went up from 3.7 to 5.5 percent.
wrote in 1949. However, our concern with constipation and other diseases of civilization has remained. By the 1950s, the United States government had strengthened regulations concerning drug labeling and advertising to a degree that discouraged producers from issuing such grossly exaggerated warnings of danger and claims of efficacy as in the early century. Thus, after autointoxication’s relegation to the realm of medical bugaboo by the medical community, laxative companies sought other language to convince consumers of the dangers of constipation. In general, their strategy was to foster a fear of “irregularity,” a condition vaguer and less dangerous than autointoxication, but one suggesting abnormality nonetheless.

The idealization of regularity is apparent in our society. Though current ads for laxatives do not grossly distort accepted medical theory as those autointoxication-based ads of the early twentieth century, many Americans still interpret “regular” as daily evacuation. In fact, a panel appointed by the FDA in 1975 concluded, “The way laxatives were being advertised tended to perpetuate, if not implant, the once-a-day idea into far too many heads.” Today, prevailing medical opinion holds that defecation schedules of healthy people vary considerably from individual to individual. Anything between three movements a day and one every three days constitutes “normal” regularity. In addition, constipation exists as a mechanical, not chemical, condition that usually accompanies an unhealthy diet, lack of exercise or other lifestyle problems. Under the prodding of laxative ads, Americans still reach for Ex-Lax or Correctol when they miss a day as the surest way to reestablish regularity.

The message from holistic or alternative medicine is even more explicitly anti-irregularity. In fact, the theory of self-poisoning from the intestines, or at least some vestige of

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autointoxication, has continued to thrive in their rhetoric. In recent years, “detoxification” of the body with herbal laxatives, colonic irrigations, and other “natural” remedies became popular once again. Many alternative diets focus on keeping up regularity, and those, like the Atkins Diet, that deemphasize the importance of high fiber simply mean dieters must buy more laxatives.\(^7\)

People today seek out cures for constipation just as fervently as those who were concerned about autointoxication. John Harvey Kellogg’s evangelism for a high fiber cereal breakfast has remained one of Americans’ most cherished beliefs about health and diet. Manufacturers of high-fiber cereals have enjoyed healthy profits based on the assertion, backed by some medical institutions, that their products provide protection from colon cancer and cure constipation. Boxes of All-Bran have been assuring consumers for nearly two decades that the cereal provides “at last, some news about cancer you can live with.”\(^8\) However, a 2000 study published in the *New England Journal of Medicine* proved the ineffectiveness of these cereals in the elimination of constipation and prevention of colon cancer.\(^9\) This study and others like it suggest that no amount of fiber can replace the standard benefits of a healthy diet and a good exercise regimen, the two best ways to avoid constipation. What will happen to the “high-fiber feeding frenzy” after these controversial assertions sink in? Many have suggested, and I agree, that the effect on the market for high-fiber cereals will be minimal.\(^10\) As was the case with autointoxication and its necessary cures, such a deeply entrenched belief, originally endorsed by

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scientific institutions, will be hard to uproot even if scientists build a mountain of contrary evidence.

Today, new and controversial chronic conditions have replaced autointoxication as the “diseases of the age.” These include chronic fatigue syndrome, repetitive stress disorder, environmental hypersensitivity, and, among the newest entrants, fibromyalgia. Like autointoxication, they are based partly on a very old disease concept associated with the physical, mental and emotional stresses of modern civilization. All lack a known organic basis and are difficult to diagnose, falling under the category of syndromes of related symptoms rather than true diseases. All lack a recognized cause, but are treatable, not curable, to a certain extent. All eschew established chronic diseases such as arthritis, diabetes, hypertension and heart disease, and doctors usually diagnose them in a desperate attempt to treat an odd combination of symptoms.¹¹

Fibromyalgia is the newest and most popular of these “new” diseases. Officially, this syndrome consists of pain lasting three months in all four quadrants of the body and pain in eleven of eighteen clearly defined pressure points. It is essentially arthritis of the tissue.¹² However, fibromyalgia has become associated with a wide range of other symptoms, including fatigue, memory problems and irritable bowel syndrome (IBS).¹³ As one writer has stated, “There is no single cause, or cure, for [fibromyalgia’s] widespread and persistent symptoms…They are a complex array of interlocking features, which may be impossible to untangle.”¹⁴ One in fifty Americans suffer from this affliction; eighty to ninety percent of these

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¹⁴ Ibid., 4.
are women. Fibromyalgia is especially difficult to treat, as it requires the reduction of a wide range of associated effects including pain, inflammation, depression and sleeplessness.

Physicians prescribe drugs from Prozac to Effexor and from Ultram to Valium. Also recommended are massage therapy, acupuncture, Pilates and various herbs.  

The reasons for diseases like autointoxication and fibromyalgia lie in both the social expectations of doctors and in Americans’ views of the harmfulness of modern civilization, which generally dictate social trends in twentieth century medicine. In a culture that worships science, it is to medicine that we first turn for help with pain or illness. Doctors, driven by humanitarian concern and social obligation, try to live up to our expectations of a diagnosis and treatment for our mysterious complex of symptoms. Before long, a “new” disease has entered the medical and cultural mainstream. In this way, our distresses become medical conditions, adding to the “disease” of modern life.

Unlike fibromyalgia, ulcers are easily diagnosed and readily apparent, but for many years, physicians also thought stress caused ulcers. 2005 Nobel Prize winners Barry J. Marshall and J. Robert Warren proved otherwise in 1982. They showed that ulcers result from harmful bacteria living in the small intestine, specifically the duodenum. This discovery contradicted the belief that the small intestine maintained a sterile environment due to the corrosive powers of our gastric juices. Instead of a chronic condition treated ineffectually by antacids and prescription medication, the two scientists proved a simple regimen of antibiotics could treat ulcers. To prove this, Marshall infected himself. He developed an ulcer, which antibiotics cured. The cultural currency of the stress-induced ulcer will remain strong, as long the

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15 Questions and Answers (no. 12).
pharmaceutical industry stands to make profits. Marshall and Warren’s discovery is interesting for me because they brought what was essentially a chronic and untreatable disease of civilization into the realm of explainable and treatable medicine. In many ways, ulcers have taken the opposite road of autointoxication.

New treatments for diseases also change with the social climate of the day. In addition, conspicuous consumption weighs heavily in the cult of science in America. The consumption of new “miracle cures” displays a deep cultural belief in the progress of science, and a willingness to believe the claims of doctors and scientists. At the turn of the twentieth century, drinking soured milk at a saloon or eating yogurt showed others that you, as a consumer, were aware of the writings of Metchnikoff and the dangers of autointoxication. A consumer of soured milk was taking part in a great social experiment as well, for one could only imagine what humans could achieve if the senility and decrepitude of old age were eliminated. The central “theology” behind the consumption of soured milk implied man’s mastery of nature by the defeat of harmful bacteria in the large intestines.

Recent times are not devoid of examples of various crazes over miracle cures purported by famous scientists. Linus Pauling’s advocacy of the benefits of Vitamin C is one notable example. Like Metchnikoff, Pauling was a Nobel Prize winner, and he came to his beliefs about Vitamin C through personal struggle and an intense relationship with his science. When he had Bright’s Disease in 1952, the chemist recovered due to a strict diet that included 100 grams of ascorbate per day. Pauling did not begin his evangelism immediately after his bout with disease, but this experience must have played some part in his decision to research and publicize greater

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benefits of Vitamin C, just as Metchnikoff’s struggle with depression inspired him to find a scientific way to happiness.

In 1970, Pauling wrote his first of several books about ascorbate entitled *Vitamin C and the Common Cold*. As Metchnikoff had with soured milk 70 years before, Pauling began his regimen in 1966 out of a desire to live another fifty years, or until he was 115. Though he cited the use of citrus fruit in the treatment of scurvy in the 18th century, the basis of his beliefs came from the relatively new orthomolecular medicine, or “the preservation of good health and the treatment of disease by varying the concentrations in the human body of substances that are normally present in the body and are required for health.” These substances, which can be supplemented with pills, include vitamins, minerals and amino acids. Pauling was convinced that for “almost all human beings the amount of Vitamin C that is contained in food is less than the optimum amount and that the state of health of almost all human beings is not so good as it would be if they were to ingest a larger amount.” *Vitamin C and the Common Cold* received tremendous attention, and drugstores throughout the country had their stocks of the new miracle vitamin cleaned out by the eager public. Pauling and his wife took ten grams of ascorbate per day, ignoring the Recommended Daily Allowance (RDA) of 45 milligrams.

Real medical controversy did not begin until Pauling began publicizing Vitamin C for the prevention and treatment of cancer. His main inspiration in this declaration was the Scottish surgeon Ewan Cameron who in 1976 observed that cancer patients on a steady diet of ascorbate

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18 His other works were: *Vitamin C, the Common Cold and the Flu* (1976), *Cancer and Vitamin C* (1979) and *How to Live Longer and Feel Better* (1986).
lived longer than expected. According to Cameron, this result came because the Vitamin C had boosted the immune system. At this time the study of antioxidants, which may protect cells from damage caused by free radicals, was in its infancy. Pauling received some of the same type of criticism as Metchnikoff did from the medical community. One harsh critic was Dr. Irvine Page, editor of *Modern Medicine*: “Pauling is following the same logic long used by cancer quacks in the sale of useless ‘cancer cures’…When even responsible investigators use shady tactics to promote their ‘discoveries’ it’s no wonder that the public loses confidence in the scientific establishment.”

Indeed, a definitive study at the Mayo Clinic published in the *New England Journal of Medicine* found that cancer patients given a placebo lived just as long as those on a ten gram per day Vitamin C regimen. Pauling, calling the Mayo study fraudulent, pushed on even after both his wife and Dr. Cameron died of cancer in their sixties. Unlike Metchnikoff, Pauling lived until he was very old, dying of prostate cancer at age 92. Today claims to the benefits of Vitamin C seem to change daily as the debate rages over the real value of antioxidants.

Soured milk has long fallen out of fashion, but Metchnikoff’s old ideas about “friendly” bacteria are receiving new life. In fact, research today on genetically-produced probiotics (healthy bacteria) may be proving Metchnikoff’s theory to be partially correct. There is no talk of autointoxication, but “new” therapeutics involving “good” bacteria have created excitement.

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24 Quoted in Brian (no. 19), 17.
Some have even suggested that Metchnikoff’s *B. bacillus* (though they may not credit him) may be helpful in preventing a number of intestinal maladies, including childhood diarrhea and colon cancer. Contemporary bacteriologists and dieticians who support the use of probiotics use the same rhetoric that Metchnikoff and American advertisers employed one hundred years ago.

Various “yogurt binges” throughout the 1970s and 1980s purported the value of good bacteria. Scientists are still finding new health benefits of yogurt. One article in the August 2004 *American Journal of Clinical Nutrition* reported that using yogurt can be effective in helping “certain gastrointestinal conditions, including lactose intolerance, constipation, diarrheal diseases, colon cancer, inflammatory bowel disease, *Helicobacter pylori* infection, and allergies.”

Now, however, the field of probiotics is redefining beneficial bacteria and revisiting a field of research that Metchnikoff pioneered. By definition, probiotics are genetically engineered bacteria taken as food additives or oral supplements, which exert a beneficial effect on the host. Many contemporary health writers are even using the same rhetoric as Metchnikoff. “For generations,” an author for *Time* magazine wrote, “people have restored the balance by eating yogurt, buttermilk or other products made from fermented milk. But nowadays you can also down a few pills that contain freeze-dried germs.”

Most probiotics are used to boost immune function. A 1991 study showed that yogurt containing a genetically engineered strain of *Lactobacillus bulgaricus* boosted T-cell function in

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young adults after four months of feeding. L. bulgaricus can also prevent disease by occupying “intestinal mucosal sites, inhibiting the attachment and growth of pathogenic organisms by achieving competitive exclusion and microbial balance.” In 2001, scientists in Helsinki reported that the consumption of probiotic milk with L. bulgaricus among children reduced by 17 percent the occurrence of respiratory-tract infections with complications. The success of Lactobacillus treatment of childhood diarrhea, which still accounts for surprisingly high morbidity and mortality worldwide, has also been reported. Some have predicted the sale of probiotics in dry form and probiotic-infused dairy products in super markets in the near future. Indeed, probiotics represent a science of the future, as well as being a reflection of the past. Soon, Metchnikoff’s face and research may return to advertising campaigns.

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34 Van Niel (no. 32).
36 The company New Zealand Dairy Foods already sells “Metchnikoff Yoghurt.”
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APPENDIX A

GERM FEARS (ACCOMPANIES CH. 1)


Science goes for things dear to us without mercy. Everybody who has lived in the country and who knows the old well loves the “old oaken bucket.” We all love it because we have read what the poet says about it, and in our schooldays we chose the poem as our “piece” and spoke it. We have quenched our thirst from the old oaken bucket with its contents after carefully looking into its dubious depths for “wigglers” and worms. We have balanced the rusty, dripping inconvenience on the curb and submerged our noses in the “nectar” we gulped. We have spilled the “crystal” on our shirt front and profanely growled as we felt it trickle down inside our collar. We have seen the leaking drizzle, from a hole in the bucket, spoil our five-cent shine. We have longed under these circumstances for a cheap glass tumbler or a common tin dripper, but in all our tribulations we never thought the old oaken bucket an iron-bound death dealer, but it seems that it is, for a scientist tells us that it is “a compound, condense mass of nitrogenous and phosphatic filthiness, the home of the microbe, and the all-prevailing bacteria.”


Mrs. De Science—Hereafter, when visitors call, you are not to take their cards. You must ask them their names. My husband has discovered 900 different kinds of bacteria on visiting cards.

Servant—Yes, ma’am.

Mrs. De Science—And when they mention their names, you are particularly to notice if their voices are hoarse. Colds are catching.


BALTIMORE, Nov. 27—Pretty girls of the Woman’s College sat beside a grinning skeleton, which had the seat of honor at a unique entertainment last night in Bennett Hall of the college. The affair was called a “laboratory supper.” Young women students from all parts of the country gathered about the board.

On the invitations were pictured bacteria, mushrooms, amoeba, and other forms of germ and plant life which the class has been studying, daintily done in water color. The floral decorations of the table represented the circulation of the blood, red carnations indicating pure and violets impure blood. The candelabra were chemical flasks holding pink candles. Chemical beakers were used for serving the water. Glass stirring rods took the place of spoons. Cream for the coffee was served from a piece of apparatus composed of bulbs and tubes.

The skeleton at the feast was decorated with a wreath of flowers. Menu cards were made attractive by biological specimens painted in water-color. The menu was made out in long scientific terms, which, however, did not detract at all from the delicious fare which was set
before the guests. Ice cream was served in the form of cats and dogs, which do duty as specimens in scientific work. Confectionary came under the head of carbohydrates.


“Have I seen them?” The microbes, you mean—
Of course, They’re all over the town!
One thinks that one really has seen
Because they have done us up brown!

“Bacteria?” Millions, no doubt,
Are out on their deadly parade!
I picture them bugs with snout
And feet that resemble a spade.

“The Germs?” Sh! Don’t mention them, please!
“I’m trying to dodge that black heap!
“A Taxpayer?” Yes, but disease
Is something, at least, one can keep.

“The Gutters? The Garbage?” Refrain!
Why mention such subjects, I pray?
In April, no doubt, there’ll be rain
To wash all this horror away!

“Be dead then?” How dare you appear
Rebellious at such a sad state?
“A Taxpayer, too?” Well, my dear,
Why can’t you take quinine and wait?
The ghost of the author, moved by the sight of Fred S. Lee’s moving pictures, desires to make some alterations in his well-known verses, as follows:

Most injurious typhoid fly,
Drink with you no more will I.
When you settle on my cup,
I, perchance, bacteria sup.
After what I’ve seen to-day,
I would have you chased away.

I dislike those feet of thine;
What they’ve touched I shall decline.
Carrier of germ and spore,
Get thee hence! Return no more!
Spreader of disease, begone!
Kindly leave my food alone.
APPENDIX B

AUTOINTOXICATION (ACCOMPANIES CH. 2)


There are some varieties of “auto-intoxication” the most skillful physicians on the map can’t handle—its severity depending generally on the number of cylinders.


“Beauty’s Fall” (by Jamison)

It was an image good to see,
With spirits high and full of glee,
And robust health endowed;
Its face was loveliness untold,
Its lines were cast in beauty’s mold;
And its own shrine it bowed.

With perfect form in each respect,
I proudly stood with head erect,
And skin surpassing fair,
Surveyed itself from foot to head,
And then complacently it said:
“Naught can with me compare.”

When lo the face began to pale,
The body looked too thin and frail,
The cheek had lost its glow;
The tongues of woe did tell,
With nerves impaired its spirits fell;
The fire of life burned low.

In the intestinal canal
Waste matter lay, and said to tell,
Was left from day to day;
And while it was neglected there
It undermined that stature fair,
And caused it to decay.
The doctor’s word I would recall
Who said: “Neglect precedes a fall,”
And verily ‘tis true;
For ye who disregard your health,
And value not that precious wealth,
Will surely live to rue.

(3) From: Jamison, 64.

Sir Astley Cooper once told me the following story: An old Scottish physician for whom I had a great respect and whom I frequently met in consultation, used to say as we were about to enter our patient’s room together, “Weel, Misther Cooper, we ha’ only twa things to keep in mind, and they’ll serve us for here and hera’ter; one is au’ways to hae the fear o’ the Laird before our e’es, that’ll do for hera’ter; and th’ t’other is to keep our boo’els au’wa ys open, and that’ll do for here.”


Expert testimony that his body was “a fermenting plant in itself” won for Charles J. Glackin of 87 Clinton Street, Bloomfield, an auto mechanic, his freedom yesterday from a conviction for driving while drunk and the consequent $200 fine and two-year suspension of a license.

Judge Walter D. Van Riper in Common Pleas Court in Newark reversed the conviction found on June 30 by Recorder Grimm in East Orange. Judge Van Riper based his decision on consultations with specialists, which brought out the fact that Glackin’s physical condition is such that it produces auto-intoxication and makes him appear habitually drunk.
APPENDIX C

METCHNIKOFF (ACCOMPANIES CH. 3)


Jesus possessed no precise notion of the incomparable idea of orthobiosis. Professor Metchnikoff thought he would bring Him down from His lofty position. He undertook to instruct Jesus, but He interrupted the scientist and said:

“You are a blind man, leading blind men. Now, if the blind lead the blind, shall they not both fall into the ditch?”

“The ditch will be disinfected, dear Lord,” replied the director of the Pasteur Institute.

Then, with toleration, he gave Jesus a complete course of scientific history, with all the progress and benefits of bacteriology, concluding thus:

“Science has justified the hopes which we had before. It is she who enables us to fight terrible diseases…On the other hand, religion, demanding absolute faith without providing means of curing evils which cripple humanity, has failed to keep its promises.”