



CONTAGION HISTORICAL VIEWS OF DISEASES AND EPIDEMICS

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Germ Theory



"Bacteria, Schizomycetes or Fission-Fungi," in *Manual of Bacteriology*. From the holdings of Francis A. Countway Library of Medicine—Harvard Medical School.

Germ theory states that specific microscopic organisms are the cause of specific diseases. The theory was developed, proved, and popularized in Europe and North America between about 1850 and 1920. Because its implications were so different from the centuries-old [humoral theory](#), germ theory revolutionized the theory and practice of medicine and the understanding of disease. It was, however, compatible with existing ideas about health, especially those associated with 19th-century [hygiene and sanitation](#).

Germ theory encouraged the reduction of diseases to simple interactions between microorganism and host, without the need for the elaborate attention to environmental influences, diet, climate, ventilation, and so on that were essential to earlier understandings of health and disease. Because of this, some important proponents of hygiene and sanitation—including [Florence Nightingale](#) and [Rudolf Virchow](#)—did not necessarily believe that acceptance of the germ theory would be associated with improvements in public health.

Germ theory was developed in a social, cultural, and economic milieu increasingly centered on the values of mass production, mass consumption, standardization, and efficiency, all of which were compatible with germ theory science and popularization. The dramatic successes of germ theory, together with a new association of medicine with the laboratory, brought about an elevation in the social status of physicians and of medical research and practice during a period of [public skepticism about the value of traditional medical practice](#).

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Early Germ Theories

Various germ theories, sometimes known as "animacular" theories, had been proposed for hundreds of years before 1850. An animalcular theory, published in 1658, can be found in Athanasius Kircher's *Scrutinium Physico-Medicum Contagiosae Luis*. In the 19th century, the animalcular theory was associated with an outdated past. The idea of tiny, invisible animals flying through the air and spreading disease seemed fanciful.

Spontaneous Generation and Zymotic Disease

Disproving notions of [spontaneous generation](#)—the theory that living organisms could arise from nonliving matter—was an important early development in the germ theory.

Proponents of spontaneous generation argued the impossibility of knowing whether microorganisms found in these materials were the cause or the product of decomposition. Later debates around the role of germs in disease would be similar; it would take years to prove that germs found in the bodies of sick people were the cause of their disease and not the result of it.

By the 1870s, when Louis Pasteur had proved that decomposition was indeed caused by microbes, it was not such a large step to investigate whether diseases were caused by microbes as well—especially since diseases were often held to be the result of infection by particles released by decomposing materials.

These particles were also sometimes proposed to be a kind of seed, or spore; the word "germ" derives from the Latin verb "to sprout."

Lister, Koch, and Pasteur

Joseph Lister, a physiologist and surgeon; **Robert Koch**, a physician and scientist; and Louis Pasteur, a chemist, are some of the most prominent characters in the history of the germ theory.

Lister is known as the inventor of **antiseptic surgical techniques**, which helped to dramatically reduce the infection mortality rate.

Robert Koch first became known for his superior laboratory techniques in the 1870s, and is credited with proving that specific germs caused anthrax, **cholera**, and **tuberculosis**. **Koch's Postulates**, which prove both that specific germs cause specific diseases and that disease germs transmit disease from one body to another, are fundamental to the germ theory.

Louis Pasteur's wealth of impressive—and occasionally showy—accomplishments from the 1860s through the 1880s include disproving spontaneous generation, showing how heat could kill microbes ("pasteurization" was first used in the French wine industry), and developing the first laboratory **vaccines**, most famously for chicken cholera, anthrax, and rabies.

Public Awareness

Germ theory required a new public awareness not only of germs as the causes of diseases, but also of the ways in which germs were spread from one person to another. The public was also taught about germs as they related to home hygiene, including cooking, plumbing, and heating. **Women were often targeted** to be the domestic evangelists of the "gospel of germs."

In the case of **tuberculosis**, which formerly had been considered noncontagious, basic changes in everyday hygiene were required. Mass production, mass communication, and national advertising had developed alongside the germ theory during the same period, and the tools of public relations were put into play to inform the public about TB's contagiousness, as well as to inform people about the germ theory in general.

Causes vs. Treatments

While germ theory may have revolutionized understanding of the causes of disease, it did not necessarily revolutionize treatment. **Vaccination** was an empirical procedure that had been developed almost 80 years earlier. Though an antitoxin for diphtheria was created in the late 19th century, and a specific drug to cure syphilis, Salvarsan, **was developed by Paul Ehrlich in 1909**, antibiotics would not be developed until the 1940s.

The great decline in mortality associated with the end of the 19th century is not associated with the impact of the germ theory, but with improved sanitation and nutrition. The identification of a disease germ does not necessarily lead to a cure for that disease.

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Selected *Contagion* Resources

This is a partial list of digitized materials available in *Contagion: Historical Views of Diseases and Epidemics*. For additional materials on the topic "Germ Theory," **click here** or **search** the collection's Catalog and Full Text databases.

Web Pages

Cholera Epidemics in the 19th Century
Humoral Theory
Domestic Medicine
Concepts of Contagion and Epidemics
International Sanitary Conferences
Robert Koch, 1843–1910
P. C. A. Louis, 1787–1872
Florence Nightingale
Public Health
Syphilis, 1494–1923
Tropical Diseases and the Construction of the Panama Canal, 1904–1914
Tuberculosis in Europe and the US, 1800–1922
Vaccination
Rudolf Virchow, 1821–1902
Max von Pettenkofer, 1818–1901

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