

A BRIEF HISTORY

Making Microscopes

Microscopes were invented in the **late 1600's** by two contemporary scientists: Robert Hooke (English); and Anton Leeuwenhoek (Dutch). The microscopes were made by heating glass and curving it. Curved glass bends light and makes objects look bigger.

- Robert Hooke first used the term “**cell**” to describe boxy-like plant cells seen from tree cork cells – they reminded him of the small rectangular rooms of monks in a monastery.
- Leeuwenhoek used the word “**animalcules**” to describe the swimming protists and bacteria he found in pond water and saliva.

The First Formalized Vaccine

Edward Jenner, in 1796, experimented on a child to see if a vaccine worked. First, he exposed the child to cowpox, then exposed him to smallpox. The child didn't develop smallpox and the vaccine was heralded a success. The name “vaccine” comes from the Latin “*vaca*”, which means cow. The reason this vaccine is believed to work is because the virus that causes cowpox is similar enough to the smallpox virus that the body's antibody response works against both.

What causes disease?

Louis Pasteur and **Robert Koch** (late 1800's) established the Germ Theory of Disease—that microorganisms cause disease. This has been shown to be true in many cases, but there are many diseases that have not been directly linked to a microorganism. A more complete theory includes that the strength and previous experiences of a body's immune system plays a critical role in whether or not microorganisms cause disease. Further, one of the most exciting areas of research today is in the field of the microbiome – the sum total of all the organisms living on and in us. This complex ecosystem has many variables that can affect health and disease.

Koch's Postulates were developed as a systematic way to identify the causative agent of a disease.

1. Take a sample from infected animal. 2. Grow sample in culture, view in microscope. 3. Inject sample back into a healthy animal. 4. Confirm that the animal develops symptoms/disease identical to the original animal. 5. Take another sample from this newly infected animal. 6. Confirm identity to be the same microscopically (as step #2)

*Koch used these steps to identify *Bacillus anthracis* as the causative agent of anthrax in cattle.

Louis Pasteur is also famous for: disproving Spontaneous Generation; developing a heating process to sterilize food products (Pasteurization); developing a rabies vaccine. He was extremely famous in his own lifetime—a French National hero.

Hand-washing, Sheet Cleaning, and Harsh Antiseptics Saved Lives

Ignaz Semmelweis (1847) (“Savior of Mothers”) required medical students in Vienna, Austria to wash hands before delivering babies – he was pretty much uniformly despised by his contemporaries for this strict rule!; **Florence Nightingale** (“Mother of Nursing”) encouraged handwashing and bedsheet cleaning in order to reduce the spread of typhoid fever amongst British Soldiers (1850's); In both cases, disease rates dropped dramatically once better hygiene was implemented.

Joseph Lister, late 1800's, used carbolic acid to prevent bacterial infection of his patients after surgery. These caustic chemicals also damaged healthy skin and lungs, though.

Mold fights Bacteria!

Alexander Fleming, 1920's, noticed that some types of mold, as a competitive advantage, could inhibit the growth of bacteria. He identified the inhibitory substance as penicillin, so named because it is made by the *Penicillium* mold. This began the era of antibiotics.