

ROBERT KOCH - THE FATHER OF CLINICAL MICROBIOLOGY

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Heinrich Hermann Robert Koch was one of the founders of the science of bacteriology. Many of the basic principles and techniques of modern bacteriology were adapted or devised by Koch. Among his important contributions were the discovery of the anthrax bacillus and its life-cycle, the discovery of the tubercle bacillus in 1882, and the cholera bacillus in 1883. He won the Nobel Prize for Physiology or Medicine in 1905.

Robert Koch was born on December 11, 1843 in the northwestern region of Germany. Since his childhood he demonstrated outstanding abilities. His young years were devoted to studies at the university and work in hospital. It was at Wollstein that he carried out his epoch-making research which placed him at the forefront of the scientific community. Although limited by the lack of equipment, cut off entirely from libraries and contact with the scientific community, and under the rigors of his own busy practice, Koch set out to study anthrax. Pollender, Rayer and Davaine had already discovered the anthrax bacillus and Koch set out to prove scientifically that the bacterium was the causative agent of disease. He confirmed it and even developed techniques to obtain pure cultures of bacteria. He also noted the formation of spores inside the bacterium when growth conditions became unfavorable and the resulting germination of these endospores when growth conditions improved.

In 1878, he published his results and provided a practical and scientific basis for the control of infections having invented new methods for cultivating pure cultures of bacteria on solid media and on agar media, new staining methods and sterilization of medical instruments using heat. Koch also laid down the foundation of criteria which are required before accepting that particular bacteria cause particular diseases: (1) the microorganism must be found in abundance in all organisms suffering from the disease, but not in healthy organisms; (2) the microorganism must be isolated from a diseased organism and grown in pure culture; (3) the cultured microorganism should cause disease when introduced into a healthy organism; (4) the microorganism must be reisolated from the inoculated, diseased experimental host and identified as being identical to the original specific causative agent.

Two years after Koch's arrival in Berlin, he discovered the tubercle bacillus (*Mycobacterium tuberculosis*) and a method for growing this bacterium in pure culture. While in Egypt, he independently discovered the vibrio that causes cholera. Using his knowledge of the mode of distribution of the cholera vibrio and his understanding of its life cycle, Koch formulated guidelines for the control of cholera epidemics. Consequently, these guidelines formed the basis of control methods which are still in use today.

Dr. Koch died in 1910 of a heart-attack at the age of 66. During his lifetime, he was the recipient of many prizes and medals, honorary doctorates. The students he mentored throughout his career found organisms responsible for diseases such as diphtheria, typhoid, pneumonia, gonorrhoea, cerebrospinal meningitis, leprosy, bubonic plague, tetanus, and syphilis, among others, by using his methods. Furthermore, he was posthumously honored by memorials and by several countries for his contributions to medicine and microbiology. He inspired major figures such as Paul Ehrlich and Gerhard Domagk and he will forever be considered one of the founders of modern microbiology. Koch Crater on the Moon was named in his honor and the Robert Koch Prize and Medal were created to honor scientists who make groundbreaking discoveries or who contribute to global health in a unique way such as he did. Perhaps Dr. Koch's greatest gift lives on every day as physicians, microbiologists, researchers, and students utilize the same scientific techniques that Koch developed over 120 years ago.

Koch's famous postulates are still relevant for today: identify a specific organism, obtain a pure culture of that organism, reproduce the disease in experimental animals using the pure culture, and recover the organism from the infected animals.