The Timeless Legacy of Robert Koch
Founder of Medical Microbiology

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Robert Koch was a German physician and scientist who made wide-ranging contributions to the study of infectious diseases. He is credited with developing medical microbiology as a new and independent discipline. He is most renowned for deciphering the etiology of tuberculosis (TB), anthrax and cholera. He laid down rigorous guidelines for establishing the link between a pathogen and a particular disease that came to be known as Koch’s postulates. To this day these postulates serve as benchmarks in the study of infectious diseases.

The year 2005 marked the 100th anniversary of the Nobel Prize awarded to Robert Koch for his discovery of the tubercle bacillus, the causative agent of TB, a disease that was rampant in Europe towards the end of the 19th century. The significance of Koch’s seminal discovery of the TB bacillus is only overshadowed by his overall contribution to the study of infectious diseases. What were the events and circumstances that triggered Robert Koch’s interest to study infectious diseases including TB?

Early Life

Koch was born in Clausthal, Germany in 1843, the son of a mining engineer. He astounded his parents by teaching himself to read at the age of five. After a successful stint at school where he showed an interest in biology, he attended the University of Göttingen, Germany, during 1862–1866 where he studied mathematics, natural sciences and later, medicine. During that period he was most fortunate to be exposed to the ‘infectious disease’ hypothesis of his teacher Jacob Henle (1809–1885), professor of anatomy and physiology. Henle had proposed that
germs, the ‘hidden contagion’, were responsible for causing many diseases. A similar role for germs in fermentation and putrefaction had been proposed by Louis Pasteur (1822–1895) of France in 1860. These were significant contributions as it was believed at that time that fumes (‘miasma’) generated during the process of degradation and putrefaction actually caused disease. A counterview to the germ theory of disease was proposed by Rudolf Virchow (1821–1902), a reputed pathologist from Berlin. Virchow’s theory was that all diseases originated within the body’s cells themselves. Henle’s teachings at the medical school probably left an indelible impression on Koch’s mind and were to guide his future search for ‘hidden contagion’.

Success with Anthrax

When Koch commenced his medical career as a District Medical Officer in Wollstein at approximately 30 years of age, he was determined to explore the relationship between disease and microorganisms (now called pathogens). He set aside some space in his own home for a small laboratory to perform his experiments on anthrax which included a microscope gifted to him by his wife, Emmy Fraats. He had no formal research training and since he was posted in rural Germany he was physically removed from the scientific and research centres of the times. While this isolation perhaps allowed Koch to have independence in scientific thought, he was handicapped by a lack of peer review and certification. He was astutely practical to realize that his experimental findings would have to be authenticated by a peer scientist to be accepted by the scientific and medical community; so he associated himself with Ferdinand Cohn (1828–1898) at the Institute for Plant Physiology, University of Breslau (present day Wroclaw in Poland). Koch conceived and executed a new approach to study the relationship between disease and microbes. Thorough examination of the tissues from experimental animals, bearing in mind the ecological context of the epidemic in humans, visual representation of the microbes became part of this original and successful strategy.