

**Programme: Bachelor of Science (First Year)**

**Subject: Microbiology**

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**Paper Title: Introduction and Scope of Microbiology**

**Unit 1: History of Development and Scope of Microbiology**

**Module Name: Contributions of Koch**

**Module No: 4**

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## **Notes**

### **Robert Koch (1843-1910)**

The first direct demonstration of the role of bacteria in causing disease came from the study of anthrax by the German physician Robert Koch (1843–1910). Koch used the criteria proposed by his former teacher, Jacob Henle (1809–1885), to establish the relationship between *Bacillus anthracis* and anthrax, and published his findings in 1876. Koch injected healthy mice with material from diseased animals, and the mice became ill. After transferring anthrax by inoculation through a series of 20 mice, he incubated a piece of spleen containing the anthrax bacillus in beef serum. The bacilli grew, reproduced, and produced endospores. When the isolated bacilli or their spores were injected into mice, anthrax developed. His criteria for proving the causal relationship between a microorganism and a specific disease are known as Koch's postulates. Koch's proof that *B. anthracis* caused anthrax was independently confirmed by Pasteur and his coworkers. They discovered that after burial of dead animals, anthrax spores survived and were brought to the surface by earthworms. Healthy animals then ingested the spores and became ill. Although Koch used the general approach described in the postulates during his anthrax studies, he did not outline them fully until his work on the cause of tuberculosis. In 1884, he reported that this disease was caused by a rod-shaped bacterium, *Mycobacterium tuberculosis*; he was awarded the Nobel Prize in Physiology or Medicine in 1905 for his work. Koch's postulates quickly became the cornerstone of connecting many diseases to their causative agent. However, their use is at times not feasible. For instance, some organisms, like *Mycobacterium leprae*, the causative agent of leprosy, cannot be isolated in pure culture.

### **Koch's Postulates**

1. The microorganisms must be present in every case of the disease but absent from the healthy organisms.
2. The suspected microorganisms must be isolated and grown in a pure culture.

3. The same disease must result when the isolated microorganism is inoculated into a healthy host.
4. The same microorganism must be isolated again from the diseased host.

#### The Development of Techniques for Studying Microbial Pathogens:

He isolated suspected bacterial pathogens in pure culture—a culture containing only one type of microorganism. He developed culture media using meat extracts and protein digests because of their similarity to body fluids. He first tried to solidify the media by adding gelatin. Fannie Eilshemius Hesse, the wife of Walther Hesse, one of Koch's assistants suggested the use of agar as a solidifying. Some of the media developed by Koch and his associates are nutrient broth and nutrient agar. Container for holding solidified media—the petri dish (plate), named after Richard Petri, who devised it.