

History of Microbiology

1. Define:

Microbiology – Microbiology is the science or study of organisms too small to be observed with the naked eye. In this class, the organisms considered (microorganisms or microbes) will include bacteria, fungi, protozoa, microscopic algae and a variety of multicellular parasites. Viruses, viroids and prions are non-cellular microscopic entities that are also important to microbiologists.

Abiogenesis – The term abiogenesis, meaning literally (a=without, bio=life, genesis=beginnings), refers to a concept suggesting living organisms could arise spontaneously from non-living materials. Also referred to as spontaneous generation, this concept proposed that living organisms arose spontaneously from materials such as mud, dew, water and a variety of other substances. This concept, widely accepted prior to the work of Redi, Spallanzani and Pasteur, is not compatible with science.

Koch's postulates – Koch's Postulates are a series of experimental steps or procedures that can be used to demonstrate the causal relationship between a specific type of microorganism and a specific disease. Koch used these steps to demonstrate that the bacteria now identified as *Bacillus anthracis* were the etiological agents of anthrax. The steps include: 1) find the suspect causative agents in every case of the disease; 2) isolate the microorganisms involved and grow them in pure cultures, 3) inoculate normal healthy susceptible animals with the suspect causative agents and observe disease symptoms develop, 4) reisolate the microorganisms from the newly diseased animals.

Etiological – Etiological agents are disease causing. Etiology is the science dealing with the causes of disease. The use of Koch's postulates allowed investigators to demonstrate that several different types of bacteria were, or could be, etiological agents.

Magic Bullet – Magic bullet was terminology popularized by Paul Ehrlich (1810) with reference to chemical agents that could be taken internally to kill the microorganisms responsible for causing disease. The search for "magic bullets" led to the development chemicals that could be used as antimicrobial drugs, some of which were antibiotics.

2. Microorganisms were used for food processing and preservation. Examples include the fermentation of grains and fruit juices, the production cheese, yogurt and leavened bread. Fermented products would keep longer than fresh juice or milk, and fermentation occurred naturally where refrigeration was not available.
3. Microbiology/ Eukaryotic microorganisms include protozoa, algae, fungi and multicellular parasites. Prokaryotic microorganisms include bacteria and archaea. The viruses, viroids and prions are non-cellular, but are often included in microbiology texts.
4. Microbiology/ Anton Van Leeuwenhoek
5. Anton Van Leeuwenhoek/ abiogenesis

6. He developed a crude form of microscope (magnified objects about 266x), observed living microorganisms, and documented his findings with an established scientific organization (British Royal Society or Royal Society of London).
7. Abiogenesis/ Louis Pasteur
8. Lazzaro Spallanzani and Louis Pasteur (Note - many other investigators conducted experiments designed to prove or disprove the concept of abiogenesis.)
9. Fermentation/ Pasteurization
10. Joseph Lister/ He washed his hands and his instruments between patients and used carbolic acid (phenol) as an antiseptic.
11. Koch's postulates provided strong evidence that bacteria could cause disease. Prior to this documentation, many people insisted that disease was punishment for sinful behavior or other transgressions as determined by supernatural beings. Koch provided scientific methods for demonstrating microorganisms were responsible.
12. Inoculate healthy, susceptible animals with the suspect microbes, and watch for the development of disease symptoms.
13. Petri developed the Petri dish, a flat container that would allow microorganisms to be grown, observed and manipulated easily without the contamination of microbial cultures.
14. Vaccine
15. Prevent disease (through vaccination)/ cure disease (antibiotics)
16. Hesse developed the use of agar as a solidifying agent in culture media.
17. Paul Ehrlich
18. Alexander Fleming/ Penicillin
19. Immunology/ Pharmacology/ Epidemiology/ Pathology