

Microbiology pioneers essay sample



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Pioneers of Microbiology

I. Antonie van Leeuwenhoek (Oct. 24, 1632- Aug. 30, 1723) A. In 1676

Leeuwenhoek saw tiny organisms in water, he was the first man to observe and describe bacteria accurately. He discovered microscopic nematodes, blood cells and sperm. He also made over 500 microscopes to view specific objects. B. Microbiology is concerned with the study of all forms of life that are too small to be seen with the naked eye. Antonie's work dealt with bacteria, which are tiny microorganisms that can only be seen with the help of instruments like the microscope, which he invented. II. John Tyndall (Aug. 2, 1820- Dec. 4, 1893)

C. In 1877 Tyndall demonstrated that dust carries microorganisms. He showed that if dust was absent, nutrient broths remained sterile, even if directly exposed to air. He also provided evidence for the existence of exceptionally heat-resistant forms of bacteria (endospores). He proposed tyndallization, a method of sterilization that can be used to destroy spores.

D. Microbiology deals with everything pertaining to microorganisms including , but not limited to the way they reproduce. Tyndall's work assisted with the understanding of just that. III. Nicolas Appert (Nov. 17, 1749- June 1, 1841)

E. He coined the term appertisation, which is the process of destroying all the micro-organisms of significance in food. He also invented the process of canning. F. Food microbiology is the study of the microorganisms that inhabit, create, or contaminate food. This includes the study of microorganisms that cause food spoilage. IV. Theodor Schwann (Dec. 7, 1810- Jan. 11, 1882)

G. Schwann identified the role played by microorganisms in alcohol fermentation and putrefaction processes. He also came up with the “ cell theory”, which states that all living things are composed of cells. H. Microbiology includes the study of all aspects of the biology of microorganisms. The science of cell biology is no exception, being that cells are the building blocks of life for all living things whether it be plant, animal or microorganism. V. Robert Koch (Dec. 11, 1843- May 27, 1910)

I. Koch proposed the “ germ theory of disease” which states that microbes cause diseases in 1876. He discovered tuberculosis bacilli in 1882 and showed that all forms of tuberculosis were caused by the same bacillus. In 1877 he introduced the method of making smears of bacteria on glass slides and staining them with aniline dyes. In 1881 Koch introduced the plate method for isolating pure cultures. In 1884 he came up with “ Koch’s postulates”, the critical test for the involvement of a microorganism in a disease. J. Koch developed a lot of microbiological techniques that are still being used today. VI. Louis Joblot (1645 – 1723)

K. In 1718, Joblot constructed the side-pillar compound microscope that utilizes stops or diaphragms to help correct chromatic aberration and includes a brass lens cap. Joblot showed that microbes were produced by multiplication of microbes brought in on the hay or suspended in the air, not spontaneously. L. Also, he was the first to address the issue of the origin of microbes in infusion of decaying organic materials experimentally. VII. Carolus Linnaeus (1707 – 1778)

M. Linnaeus's new system provide a well-organized way of classifying known plants and animals, while at the same time providing a method of naming and grouping new specimens. Linnaeus main focus was on the number of observable characteristics of the organism, specifically its physical structure and details of reproduction. N. Linnaeus also developed a two-part naming system(called binomial nomenclature) in which each living organism was given a two-part Latin name to distinguish it from all. VIII. Hans Christian Joachim Gram (1853 - 1938)

O. In 1804, Gram published his work on staining cells, which became widely known as Gram staining. P. Gram's method aided microscopic study of bacteria, as well as provided a means of differentiating and classifying bacteria cells. IX. Matthias Schleiden (1804 - 1881)

Q. Matthias was the first to recognize the importance of cells as fundamental units of life. He stated that all plants are made of cells, which eventually help lead to the creation of the cell theory. R. In 1838, he argued that all the various plants structures are composed of cells or their derivatives (phytogenesis). X. Joseph Lister (1827 - 1912)

S. In 1865 lister concluded that sepsis was akin to fermentation and was initiated by infectious agents, air-born. In 1867 he shown that antiseptic procedures are very successful T. This discovering made it easier for surgeons when performing an operations and prevents the patients from getting infected. This operation marked a turning point in the acceptance of germ theory and antiseptis among physicians. XI. Ernst Heinrich Philipp August Haeckel (Feb. 16, 1834 - Aug. 9, 1919) U. Ernst Haeckel discovered,

described and named thousands of new species, mapped an ancestral tree relating all life forms, and coined many terms in biology including: anthropogeny, ecology, phylum, phylogeny, stem cell, and the kingdom Protista. V. Haeckel promoted and popularized Charles Darwin's work in Germany and developed the controversial recapitulation theory claiming that an individual organism's biological development parallels and summarizes its species' evolutionary development. XII. Francesco Redi (Feb. 18, 1626 – March 1, 1697)

W. Francesco Redi is the first to offer that spontaneous generation was not valid. X. Redi is most well known for his series of experiments, published in 1668 as *Esperienze Intorno alla Generazione degl'Insetti* (Experiments on the Generation of Insects), which is regarded as one of the first steps in refuting “spontaneous generation” – a theory also known as Aristotelian abiogenesis. At the time, prevailing wisdom was that maggots formed naturally from rotting meat. XIII. Georg Friedrich Schroder (Sept. 28, 1810 – May 12, 1885) Y. Schroeder along with von Dusch altered Shultze and Schwann's experiment by placing a cotton filter over the glass tube instead of treating the tube with heat and chemicals. The filter did not affect the air, but was effective in filtering out microbes. Z. He developed a method of air sterilization by filtration through cotton, and used it for the preservation of food. This for Microbiology important discovery was the basis of later studies of Louis Pasteur. XIV. Louis Pasteur (Dec. 27, 1822 – Sept. 28, 1895)

[. Pasteur is regarded as one of the three main founders of microbiology, together with Ferdinand Cohn and Robert Koch. . He was one of the most important founders of medical microbiology.]. He disproved the theory of

spontaneous generation by developing the “ Swan Necked Flask”. The flask had a neck that allowed air in and out but didn’t allow air to directly fall on the contents of the flask (only on the neck). Nothing grew. When liquid turned and exposed to the neck where the air directly fell microbes grew. ^.

He is remembered for his remarkable breakthroughs in the causes and preventions of diseases. _.

His discoveries reduced mortality from puerperal fever, and he created the first vaccines for rabies and anthrax.

His experiments supported the germ theory of disease. a. He was best known to the general public for inventing a method to treat milk and wine in order to prevent it from causing sickness, a process that came to be called pasteurization. XV. Lazzaro Spallanzani (Jan. 10, 1729 – Feb. 12, 1799) b. His research of biogenesis paved the way for the investigations of Louis Pasteur. c. He replicated Needham’s experiment and didn’t get growth. He claimed that Needham didn’t boil the flasks long enough nor seal them properly. He believed microbes were in the air and contaminated the flasks. d. His experiment suggested that microbes move through the air and that they could be killed through boiling. XVI. Robert Hooke (July 18, 1635 – March 3, 1703)

e. In the early 1660’s, Robert Hooke was the first person to use the microscope for academic reasons. He also invented the iris diaphragm and the compound microscope. f. In 1665 Hooke published his ground breaking book *Micrographia*. In it he described all he had studied and witnessed of the microscopic world. Hooke studied insects, sponges, bryozoans, foraminifera, bird feathers and plant sections and in a particular cork piece he saw tiny honey-comb like structures which he called “ cells”, he had discovered plant

cells. Later, researchers saw the same structures in all types of living organisms and the name stuck. g. Hooke also verified Leeuwenhoek's discovery of bacteria and protozoa. h. Hooke's studies opened an entire world for us to be able to understand how the microbial world works.

Through his inventions, we can easily see the living things invisible to the naked eye. XVII. Ellie Metchnikoff (May 15, 1845 - July 15, 1916)

i. He discovered phagocytosis in 1802 while observing cells moving freely within transparent starfish larvae. Till then, scientist believed that white blood cells consumed bacteria and infections and spread them throughout the body but Ellie discarded this and through several experiments proved that the white blood cells actually help free the body of infections by engulfing the invading germs. This resulted in him co-winning the Nobel Prize in 1908. He also discovered that certain bacteria's found in spoiled milk helped benefit to a healthy and longer life. j. Metchnikoff made an important discovery on how the defense in our body works. Because of his ingenuity we know that WBC help, not kill us. Also, he introduced probiotics for healthy living. XVIII. Theodor von Dusch (Sept. 17, 1824 - Jan. 13, 1890) k. In 1854, Theodor Von Dusch along with Georg Schroeder performed experiments to disprove the theory of spontaneous generation. They passed air through cotton into flasks containing heated broth. No microbes were observed in the diffusion due to the filtering out of microscopic organisms by cotton. Following this, Schroeder and von Dusch introduced the idea of using cotton plugs for plugging microbial culture tubes. l. Von Dusch's discovery on how to filter microbes now helps us keep microbes in or out of important places

such as culture tubes or wounds. XIX. John Needham (Sept. 10, 1713 – Dec. 30, 1781)

m. John Needham was an English microscopist who performed experiments on spontaneous generation. In 1668 an Italian scientist, Francesco Redi, designed an experiment to test the theory of spontaneous generation. He placed fresh meat in two separate jars leaving one uncovered and the other covered with a cloth. Days later he realized the uncovered jar had maggots and the covered jar did not but he did notice there were maggots atop the cloth. He successfully proved the maggots came from fly eggs thereby disproving spontaneous generation. Needham disagreed, so he conducted an experiment himself. He placed broth into a bottle, heated it to kill anything inside, and sealed it. Days later he observed living organism in the broth proving spontaneous generation. But in reality he had not heated the broth long enough to kill all living organisms as Spallanzani, another Italian scientist, proved with a similar experiment. n. Although he failed in his experiment, Needham's intent to prove spontaneous generation lead to discovering how long a liquid must be heated before being completely microbe free. XX. Ferdinand Cohn (Jan. 24, 1828 – June 25, 1898)

o. Cohn is considered a founder of modern bacteriology and microbiology. In the 1850's he studied the growth and division of plant cells and in 1855 wrote multiple papers on their sexuality. In 1870 he was mostly dedicated to studying bacteria, so much that the University of Breslau, his work place, became an innovation center for microbiology. Cohn was the first to classify algae as plants and was also the first to define what differentiated them from green plants. Cohn also classified bacteria into 4 groups, which are still used

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today, giving one of them the name *Bacillus subtilis*. p. Today we are able to differentiate by name the different types of bacteria thanks to Cohn's work

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