

## HISTORY OF MICROBIOLOGY (in chronological order)

- 1590: Mounted two lenses in a tube to produce the first compound microscope. (Hans and Zacharias Janssen, Dutch lens grinders)
- 1660: Published "Micrographia", containing drawings and detailed observations of biological materials made with the best compound microscope. (Robert Hooke)
- 1677: Observed "little animals" (Antony Leeuwenhoek)
- 1796: First scientific Small pox vaccination (Edward Jenner)
- 1850: Advocated washing hands to stop the spread of disease (Ignaz Semmelweis)
- 1861: Disproved spontaneous generation (Louis Pasteur)
- 1862: Supported Germ Theory of Disease (Louis Pasteur)
- 1867: Practiced antiseptic surgery (Joseph Lister)
- 1876: First proof of Germ Theory of Disease with *Bacillus anthracis* discovery (Robert Koch)
- 1877: Published his method for fractional sterilization (John Tyndall)
- 1879: *Neisseria gonorrhoeae*, the first human pathogen identified. (Albert Neisser)
- 1880: Finds malarial parasites in erythrocytes of infected individuals. (C. L. Alphonse Laveran)
- 1881: Growth of Bacteria on solid media (Robert Koch)
- 1882: Outlined Koch's postulates (Robert Koch)
- 1882: Developed acid-fast stain (Paul Ehrlich)
- 1882: *Mycobacterium tuberculosis* isolated. (Robert Koch)
- 1883: Independently discovered *Corynebacterium diphtheriae*. (Edward Theodore Klebs and Friedrich Loeffler)
- 1883: Pioneered developments in microscopy such as immersion lenses and apochromatic lenses which reduce chromatic aberration. (Carl Zeiss and Ernst Abbe)
- 1884: Developed Gram stain (Christian Gram)
- 1884: Process of phagocytosis described. (Ilya Ilich Metchnikoff)
- 1885: First Rabies vaccination (Louis Pasteur)
- 1885: Discovered cure for syphilis (Paul Ehrlich)
- 1885: *E. coli* identified. (Theodor Escherich)
- 1887: Invented Petri Dish (Julius Richard Petri)
- 1888: Toxin of *Corynebacterium diphtheriae* discovered. (Emile Roux and Alexandre Yersin)
- 1889: Discovered that bacteria can be agglutinated by serum. (A. Charrin and J. Roger)
- 1889: First pure culture of the strict anaerobic pathogen, the *Clostridium tetani*. (Kitasato)
- 1890: Discovery of diphtheria antitoxin serum. (Emil von Behring and Shibasaburo Kitasato)
- 1891: Proposed that antibodies are responsible for immunity. (Paul Ehrlich)
- 1892: Discovered virus of tobacco mosaic disease (Dmitri Iosifovich Ivanovski)
- 1892: *Clostridium perfringens* identified. (William Welch and George Nuttall)
- 1893: First account of a zoonotic disease, established that ticks carry *Babesia microti*. (Theobald Smith and F.L. Kilbourne)
- 1894: Endotoxin identified in *Vibrio cholerae*. (Richard Pfeiffer)
- 1894: *Yersinia (Pasteurella) pestis* isolated. (Alexandre Yersin)
- 1897: Killed vaccine against plague. (Waldemar Haffkine)
- 1897: Killed vaccine against typhoid fever (Almworth Wright and David Sample)
- 1899: Recognized viral dependence on cells for reproduction (Martinus Beijerinck)
- 1899: Showed that the malarial parasite undergoes a cycle of development in mosquitoes and that the disease is transmitted by the bite of female mosquitoes. (Ronald Ross)
- 1900: Proved that mosquitoes carry the yellow fever agent (Walter Reed)
- 1901: Complement fixation test developed. (Jules Bordet and Octave Gengou)
- 1903: *Leishmania donovani* observed. (William Leishman)
- 1905: *Treponema pallidum* identified. (Fritz R. Schaudinn and Erich Hoffman)
- 1909: Causative agent of Rocky Mountain spotted fever, Rickettsia identified. (Howard Ricketts)
- 1909: *Trypanosoma cruzi* identified. (Carlos Chagas)
- 1910: Systematic and scientific studies of dermatophytes, medium for the growth of pathogenic fungi. (Raymond Sabouraud)
- 1911: Experimental proof of an infectious etiologic agent of cancer. (Francis Peyton Rous)

1915: First discovery of bacteriophage. (Frederick Twort)  
1917: Coined the name "bacteriophage." (Felix d'Herrelle)  
1919: Blood agar used as a medium to study the hemolytic reactions for the genus *Streptococcus*. (James Brown)  
1924: BCG to immunize against the tuberculosis. (Albert Calmette and Camille Guerin)  
1926: Distinguishes between bacteria and viruses, establishing virology as a separate area of study. (Thomas Rivers)  
1928: Discovered transformation in bacteria and establishes the foundation of molecular genetics. (Frederick Griffith)  
1928: Discovered Penicillin (Alexander Fleming)  
1931: Constructed the first electron microscope. (Ernst Ruska)  
1931: Devise a technique of cultivating viruses in eggs. (Alice Woodruff and Ernest Goodpasture)  
1933: Described a method of producing streptococcal antigens and sera for use in precipitin tests. (Rebecca Lancefield)  
1934: First typing of a strain of bacteria with bacteriophage. (Alice Evans)  
1938: Vaccine against yellow fever. (Max Theiler)  
1940: Isolate the antibiotic from Fleming's mold cultures and demonstrate that it can cure infections. (Howard Florey and Ernest Chain)  
1940: Bacterial product recognized to mediate resistance to an antibacterial agent (Penicillin) in *E. coli*. (Ernest Chain and E.P. Abraham)  
1940: Discovered actinomycin, the first antibiotic obtained pure from an actinomycete. (Selman Waksman and H. Boyd Woodruff)  
1941: Demonstrated that penicillin is non-toxic to human. (Charles Fletcher)  
1941: Viral hemagglutination described. (George Hirst)  
1942: Birth of immunofluorescence. (Albert H. Coons, H.J. Creech, R.N. Jones, and E. Berliner)  
1942: Identify adjuvants that can significantly boost antibody production. (Jules Freund and Katherine McDermott)  
1944: First to demonstrate successful treatment of tuberculosis with streptomycin. (W. H. Feldman and H. C. Hinshaw)  
1949: Technique to grow polio virus in test tube cultures of human tissues. (John Franklin Enders, Thomas H. Weller and Frederick Chapman Robbins)  
1952: Used the term plasmid to describe extranuclear genetic elements that replicate autonomously. (Joshua Lederberg)  
1952: Transduction discovered in *Salmonella typhimurium*. (Joshua Lederberg and Norton Zinder)  
1953: Killed polio vaccine. (Jonas Salk)  
1953: First useful fungal antibiotic, NYSTATIN developed. (Elizabeth Lee Hazen and Rachel Fuller Brown)  
1957: Interferon discovered. (Alick Isaacs and Jean Lindemann)  
1957: Proposed that a slow virus is responsible for the wasting disease kuru. (D. Carleton Gajdusek)  
1958: Antibody labeling agent, fluorescein isothiocyanate (FITC) developed. Beginning of RIA and ELISA. (Joseph H. Burkhalter and Robert Seiwald)  
1959: Transferable drug resistance discovered in *Shigella*. (O. Sawada)  
1963: Described the "Australia Antigen" (hepatitis B antigen). (Baruch Blumberg)  
1963: Vaccine against Hepatitis B. (Baruch Blumberg and Irving Millman)  
1966: Established standards for antibiotic susceptibility testing based on disc diffusion procedure. (William Kirby and Alfred Bauer)  
1967: Viroids discovered. (Theodor O. Diener)  
1968: Limulus lysate assay for endotoxin detection. (Levin and Bang)  
1969: DNA hybridization used to classify members of family Enterobacteriaceae. (Don Brenner)  
1970: Restriction endonucleases, important tool in genetic engineering discovered. (Hamilton Smith and Kent W. Wilcox)  
1970: Independently discovered reverse transcriptase in RNA viruses. (Howard Temin and David Baltimore)  
1972: Recombinant DNA molecule from viral and bacterial DNA constructed. (Paul Berg)  
1975: Sexual reproduction in the fungus described. (Kyung and Kwon-Chung)  
1975: Monoclonal antibodies by Hybridoma technique. (Georg Kohler and Cesar Milstein)  
1976: Proto-oncogenes identified. (J. Michael Bishop and Harold Varmus)  
1976: *Plasmodium falciparum* cultivated in vitro. (William Trager and Jim Jensen)  
1977: Developed a method to sequence DNA (W. Gilbert & F. Sanger)  
1979: Smallpox (variola) is declared officially eliminated  
1982: Prions discovered. (Stanley Prusiner)  
1983: Polymerase Chain Reaction invented (Kary Mullis)  
1983: Discovery of the immunodeficiency virus (HIV). (Luc Montaigner and Robert Gallo)  
1984: *Helicobacter pylori* identified. (Barry Marshall)  
1985: First anti-retroviral AZT discovered. (Robert Gallo, Dani Bolognesi, Sam Broder)  
1995: First microbial genomic sequence published (*Haemophilus influenzae*) (TIGR)