

MICROBIOLOGY

Discover the science of microorganisms

Organisms & Evolution //

Microbiology: The study of living things too small to see with the naked eye

- The four main divisions of life are bacteria, archaea, eukaryotes, and viruses
- Each division's DNA is more similar to its own than to any of the other three



Characteristic	Bacteria	Archaea	Eukaryotes	Viruses
Size	0.2–5 micrometers	0.2–5 micrometers	1–90 micrometers	0.02–0.3 micrometers
Nucleus	No	No	Yes	No
Genetic information	DNA	DNA	DNA	DNA or RNA
Lipid bilayer	Yes	Modified	Yes	Sometimes
Ribosomes	Small, unique	Small, more like eukaryotes	Large	No
Membrane-bound organelles	No	No	Yes	No
RNA polymerase	Single, 3 subunits	More complex, 8 subunits	Most complex, 12 subunits	Depends on genetic material
Grow without outside help	Yes	Yes	Yes	No
Maximum number of cells	1	1	Many	Non-cellular
Cell wall	Peptidoglycan	Several different forms	Cellulose, sometimes none	None

Bacteria

- Were the first cells on Earth
- Contain over 50 different phyla (major groupings)
- Are the most abundant form of life
 - People have more bacteria growing on/in them than human cells
- Incredibly diverse
 - There are thousands of different species in one gram of soil
- Live in most environments, including the deep sea, underground, and terrestrial

Archaea

- Relatively uncommon with fewer known species
 - Most common in extreme environments (e.g., deep sea vents and high salinity lakes)
- Combine some features of prokaryotes and eukaryotes
- Often known as extremophiles and will grow when other organisms cannot
 - ENO: Halophiles, salt loving; sulfophiles, sulfur loving; thermotrophs, heat loving; lithotrophs, rock loving; methanophiles, methane loving (ruminant guts)

Eukaryotes

- May be single cells (e.g., yeast, algae, and amoebas) or multicellular (e.g., fungi, plants, and animals)
 - Contain membrane-bound subcompartments that separate specific functions, particularly the nucleus
 - Division includes microscopic organisms previously belonging to the Monera kingdom

Viruses

- Many feel viruses are not alive as they are obligate parasites and cannot replicate without other cells
- Different viruses target all three domains
- Viruses may use DNA or RNA as genetic material and use molecules from the host cell to make more virus particles, ultimately killing the host

Shapes & Types //

Bacterial & Archeal Cell Shapes & Growth Characteristics

- Cocci: Spherical
- Bacilli: Rod-shaped
- Spirilla: Spiral-shaped
- Pleomorphic: Multiple shapes are possible



- Diplo- Prefix meaning two; a diplococcus is two cocci that have grown together
- Tetrad: Four cocci that grow together in a plane
- Sarcinae: Eight cocci that grow together in a cube
- Strepto- Prefix meaning chain; a streptococcus is cocci that have grown together in a chain
- Staphylo- Prefix meaning cluster; a staphylococcus is cocci that have grown together in a cluster

Eukaryotic Types

- Ciliates: Short cilia used for locomotion and/or feeding
- Flagellate: Long flagella used for locomotion; usually there are only one or two per cell
- Slime mold: Single cells living in a damp environment (e.g., under leaves in a forest) that come together during replication



- Amoeba: Free-form cell that can change its shape and engulf its prey
- Protist: Non-plant, non-fungi organism (e.g., ciliates and flagellates)
- Algae: Photosynthetic organism with a nuclei and chloroplasts. Many are single cells, others are multicellular, but many forms are still microscopic (i.e., volvox)
- Diatoms: Photosynthetic eukaryote with a silicate cell wall often with a complex symmetrical pattern
- Yeast: Eukaryotic, single-celled, round fungi
- Mush: Multicellular fungus which forms hair-like projections (hyphae) that may contain crosswalls (septate) or not (non-septate)

Viral Shapes

- Helical: Spiral arrangement of protein capsid molecules that can appear rod-shaped

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Zhe Xu



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Microbiology Study Guide Elizabeth Machunis-Masuoka, 2004 Microbial Applications Vol.2 Vipin Chandra Kalia, 2017-04-17 This contributed volume provides insights into multiple applications using microbes to promote productivity in agriculture to produce biochemicals or to respond to challenges in biomedicine It highlights the microbial production of nanocompounds with medical functionality alongside new anti mycobacterial strategies and introduces plant growth promoting Rhizobacteria as well as the correlation between biofilm formation and crop productivity Further the authors illustrate the green synthesis of biochemical compounds such as hydroxamid acid or biosurfactants using microbial and fungal enzymes It inspires young researchers and experienced scientists in the field of microbiology to explore the combined use of green white and red biotechnology for industrial purposes which will be one of the central topics for future generations **Peterson's Annual Guides to Graduate Study** ,1983 Study Guide for Microbiology Pearson, Robert W. Bauman, Elizabeth Machunis-Masuoka, Laura Bonazzoli, 2005-02-23 This valuable study tool features chapter summaries self quizzes critical thinking questions and a guide to using the Microbiology Place Website and CD ROM **National Library of Medicine Current Catalog** National Library of Medicine (U.S.), 1971 First multi year cumulation covers six years 1965 70 **Pearson's Clinical Medical Assisting** Nina Beaman, Lorraine Fleming-McPhillips, 2007 Having a balanced understanding of legal and ethical concepts and applying them to a multitude of real life clinical and administrative situations is essential to any health professional This text provides this balance by helping health professionals understand both the intention as well as the realities of the law All the while preparing them for the major ethical considerations and dilemmas they may encounter Written in a straightforward manner aimed at health professionals in a variety of settings this book introduces the reader to many topics affecting health care today such as the legal system patient physician relationship professional liability and malpractice prevention confidentiality physician s public duties medical records and bioethical issues Through this introduction healthcare professionals will better understand the ethical obligations to the patient the employer and themselves For Medical Assisting students **Manual of Environmental Microbiology** Cindy H. Nakatsu, Robert V. Miller, Suresh D. Pillai, 2016-05-02 The single most comprehensive resource for environmental microbiology Environmental microbiology the study of the roles that microbes play in all planetary environments is one of the most important areas of scientific research The Manual of Environmental Microbiology Fourth Edition provides comprehensive coverage of this critical and growing field Thoroughly updated and revised the Manual is the definitive reference for information on microbes in air water and soil and their impact on human health and welfare Written in accessible clear prose the manual covers four broad areas general methodologies environmental public health microbiology microbial ecology and biodegradation and biotransformation This wealth of information is divided into 18 sections each containing chapters written by acknowledged topical experts from the international community Specifically this new edition

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Laboratory Manual in General Microbiology Ward Giltner,1916 Manual of Clinical Microbiology Patrick R. Murray,American Society for Microbiology,1999 Intended to guide clinical microbiologists in the selection performance and interpretation of laboratory procedures for diagnostic and theraputic applications A reference source detailing what is done in clinical microbiology laboratories **Laboratory Manual in General Microbiology** Michigan State University. Department of Bacteriology and Public Health,1916 **Peterson's Guide to Graduate Programs in Business, Education, Health, Information Studies, Law and Social Work 1997** Peterson's,1996-12-15 This guide contains listings for the most popular professions covering over 13 000 programs in advertising allied health business dentistry education health administration human resources development law medicine nursing optometry pharmacy podiatry public health social work veterinary medicine and more **Mechanizing Microbiology** Anthony N. Sharpe,David S. Clark,1978 **The Publishers' Trade List Annual** ,1991 *Microbiology* Berdell R. Funke,2006-07-19 A study guide to accompany the textbook provides explanations of major concepts definitions of important terms questions and answers and experiments

Microorganisms in Our World Ronald M. Atlas,1995 Scientific study of microorganisms Micobial physiology cellular biology Microbial genetics molecular biology Microbial replication and growth Microorganisms and human diseases Applied and environmental microbiology Survey of microorganisms **Peterson's Guide to Graduate Programs in the Biological Sciences 1997** Peterson's,1997-01-05 Graduate students depend on this series and ask for it by name Why For over 30 years it s been the only one stop source that supplies all of their information needs The new editions of this six volume set contain the most comprehensive information available on more than 1 500 colleges offering over 31 000 master s doctoral and professional degree programs in more than 350 disciplines New for 1997 Non degree granting research centers institutes and training programs that are part of a graduate degree program Five discipline specific volumes detail entrance and program requirements deadlines costs contacts and special options such as distance learning for each program if available Each Guide features The Graduate Adviser which discusses entrance exams financial aid accreditation and more The only source that covers nearly 4 000 programs in such areas as oncology conservation biology pharmacology and zoology

A New Guinea Bibliography: Languages, Literature, Science and Medicine ,1984 **Manual of Environmental Microbiology** Christon J. Hurst,Ronald L. Crawford,2002 The new second edition of this essential manual summarizes the

information and knowledge of environmental microbiology in a single source It details the natural fate of microorganisms in the environment as well as the intentional attempts to eliminate from the environment microorganisms that are pathogenic to humans or to plants and animals The basic principles of environmental microbiology and general analytical methodologies common across the range of the environments covered are presented first The core sections are structured with regard to the type of environmental medium being discussed This landmark effort defines the study of environmental microbiology as we know it today and serve as an essential contribution to the literature

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