Links to our Past

News of the Present

Insight for the Future


Alfred R. Wallace
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Website Topical Index

Biology – The Science of Life

Biology -- Living Organisms

Nothing in Biology Makes Sense except in the Light of Evolution
An essay by Theodosius Dobzhansky (1900-1975).

Open Directory : The Open Directory goal is to produce the most comprehensive directory of the web, by relying on a vast army of volunteer editors. For more depth than you can find here, for almost any topic in science, see this website.

Need an Online Dictionary? Here is a Biology Dictionary that may be useful for definitions of technical terms. The Glossary for Life History and BioTech's Life Science Dictionary are among the best.

Web-based Reference Resources : Abstracts & Indexes Online; Atlases; Bibliographies; Biographies; Conversions, Calculators, Simulations, Dictionaries, Encyclopedias & other Biology Libraries.

Online Courses of Study

Allied Topics

Abiogenesis - First Life

Botany

Cell Biology

Ecology

Genetics

Human Health

Systematics & Taxonomy

Systematics & Taxonomy

Need a Name? : The Zoological Record
Official Biological Nomenclature

What is Cladistics? From the Journal of Avocational Paleontology

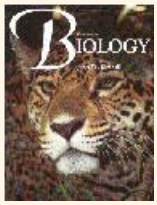
Journey into the World of Cladistics
Univ. of Calif. at Berkeley

The Dinosauricon : Classification and Cladogram for Dinosaura

North American Fossil Mammals : Cretaceous and Cenozoic fossils.

Correcting Science

Biology is a vast subject. A proper understanding of biology or evolution requires also some comprehension of chemistry, genetics, biogeography, botany, zoology and other disciplines. The beginning student should start with a biology textbook. Several good ones are available here. Read one.



Kimball's Biology Pages

Kimball's General Biology was first published in 1965. This is the sixth edition of 1994, and serves as the basis for this online course. The topical sections below are all keyed to Kimball's textbook. For basic instruction I suggest you go there.

OBB Online Biology Book : More than 50 chapters and glossary. These are from freshman-level biology courses at Maricopa - Estrella Mountain Community College.

Biology Hypertextbook: If you're learning molecular biology or just want a refresher, try this site. Intended for an introductory biology course at the Massachusetts Institute of Technology, the 11 clearly written, well-illustrated chapters cover topics such as basic chemistry, genetics, photosynthesis, immunology, and recombinant DNA. Practice problems are at the end of each chapter.

The Biology Project : from Univ. of Arizona, offers instruction in Biochemistry, Cell Biology, Chemicals & Human Health, Mendelian Genetics, Developmental Biology, Human Biology, DNA forensics, Immunology, Molecular Biology, Recombinant DNA

Biology II : Chapter Outlines, Study Guides and Related Internet Sites. A Great website for studying human biology.

BIOLOGY by Miller & Levine : offers excellent online guide for students and teachers. This is a virtual edition of a popular classroom textbook and contains updates to the 5th edition.

Biology 1060 Topics: This is a great course in biology, starting with the question "What is Science?" It covers cell biology and introduction to the animal kingdoms.

Second Thoughts on Peppered Moths
This classical story of evolution by natural selection needs revising.

Proposed Research on Kettlewell
Study of this episode promises insight into the nature of how science is por-trayed in science textbooks.

Peppered Moth : We have to look more closely at these and the scientists who studied them.

Peppered Moth Update : One textbook by Miller & Levine has modified the chapter in which the peppered moth case is discussed. Go to BIOLOGY.

Anatomy

Visible Human Project : Presents complete, anatomically detailed, three-dimensional representations of the normal male and female human bodies.

Comparative Anatomy and Embryos : Biology 1060. The central idea of evolution - descent with modification - can be seen over and overwhen we compare anatomical similarities among organisms that were classified together long before anyone thought that they evolved from common ancestors.

The Origin of Animal Body Plans : For its first 3 billion years on earth, life was no larger or more sophisticated than a single cell. All of that changed when almost 600 million years ago new, multicellular life forms appear in the fossil record. Starting with simple soft-bodied creatures this evolutionary innovation culminates in the "Cambrian explosion," a burst of biological creativity unprecedented in earth's history. This is a comprehensive series of well illustrated articles deserving of time for reading.

Atlas of Zebrafish Vascular Anatomy : The Atlas of Zebrafish Vascular Anatomy takes advantage of the zebrafish's transparency, tracking its blood vessel development with striking photos, drawings, and footage.

Skull Central : How do you peer inside an egg without breaking it? One way is with high-resolution x-ray computed tomography, which allows researchers to probe both soft and hard tissue, then assemble flat x-ray pictures into a 3D image. The Digital Morphology Group at the Univ. of Texas, Austin, has built a library of the skeletons of both modern and fossil vertebrates. There is also an anatomical tutorial to Thrinaxodon, a 245-million-year-old creature that is transitional between mammals and their ancestors.

Micro MRI Mouse Atlas : This site provides labeled brain slices and rotating, 3D color computer models of the anatomy of a 13.5-day-old embryo. Magnetic resonance imaging allowed imaging an intact specimen without damaging tissues. The site has MRI movies that let you view slices of embryos at different developmental stages. Another website Mouse Atlas and Gene Expression includes high-resolution, annotated images of histologic sections of a developing embryo from 5.5 to 9 days after conception. The site also links to a gene expression data bank: Click on the spinal cord, for example, to get a list of genes expressed in that tissue.

Dissection of a Frog : Without catching even a whiff of formaldehyde, ten easy-to-follow explorations meld computer graphics and photos of real dissections to simulate the disassembly of an amphibian.

Animal Behavior

Behavior at Kimball's Biology. Includes discussions of Innate Behavior, Circadian Rhythms, Honeybee navigation, some forms of learned behavior and more.

Animal Behavior Resources on the Internet : Animal Behavior Information, Professional Societies, Animal Behavior Journals, Graduate Programs, Usenet Newsgroups, Mailing Lists

Bacteriology

Red Tides: Harmful Algal Blooms : This page is supported by a NSFoundation / NOAA grant to the National Office for Marine Biotoxins and Harmful Algal Blooms at Woods Hole Oceanographic Institution.

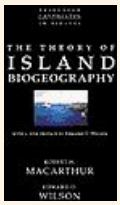
Caenorhabditis elegans : A small (about 1 mm long) soil nematode found in temperate regions. In the 1960's Sydney Brenner began using it to study the genetics of development and neurobiology. Since then the community of C. elegans researchers has expanded to over a thousand.

Bacteria alive after 250 million years : Ancient bacteria trapped in a state of suspended animation for 250 million years are the world's oldest living things, claim US scientists. The microbes are ten times older than any previously discovered living organism and may reopen the debate about the origins of life on Earth.

Textbook of Bacteriology : The textbook should be available after September 1, 2002.

Biogeography

The Theory of Island Biogeography was proposed by Robert Macarthur and Edward O. Wilson. It has been a powerful tool for explaining the biogeographical diversity of life, expanding upon the earlier work of Darwin and especially that of Alfred Russel Wallace. This book is responsible for the creation of a new field of study in biology and evolution. You can see this book, and search for others bearing upon the subject, at Amazon.com.



Island Biogeography and Evolution: This website is about the evolution of three species of lizards on the Canary Islands. Its purpose is to demonstrate to students that evolutionary problems are complex and solutions may involve data from various disciplines of science. See also: Biogeography and Nearctica - Island Biogeography. And don't miss this review of Kenneth Friedman's book: Island Biogeography is not for Dodos.

Introduction to Biogeography: Biogeography is the study of the distribution of plants and animals over the surface of the Earth in both a spatial and temporal context. This is a thorough course outline on the subject.

Biology Journals and Organizations

The Linnean Society of London : A living forum for biology

Center for Biology Education : Univ. of Wisc. at Madison.

National Association of Biology Teachers

Open Directory - Science: Biology: Education

Education-Biology : Biology Information Resources Webguide

J. Biol :: An Online Journal of Biology: A new, free access, journal of biology.

Biographica : Brief descriptions of various and sundry names that one encounters in online discussion of biological topics and abiogenesis where these cross with religiously motivated anti-science partisans.

International Organization of Biological Field Stations : This listing of more than 200 stations from Ethiopia to Iceland tells about scientific facilities, accommodations, and research and funding opportunities.

Cancer

Cancer at Kimball's Biology. Includes angiogenesis, the role of a proto-oncogene in leukemia and apoptosis, cancer cells in culture, mutations: causes and significance, oncogenes: whose disregulation leads to cancer, tumor suppressor genes and more.

Cell Biology

Cell Biology at Kimball's Biology Includes animal cells, the cell cycle, chloroplasts, chromosomes, golgi apparatus, mitosis and meiosis, the nucleus, photosynthesis, polyploidy, ribosomes, stem cells and much more.

Cell Organization : Biology 1060. Living things, take in and use nutrients and energy, maintain an internal environment different from the surrounding environment, grow and reproduce, respond to stimuli from their surroundings, evolve, and are composed of units called cells (at least here on earth).

OBB Cells: Origins : This page discusses pre-evolutionary concepts and hypotheses regarding the origin of the universe and the first forms of life (abiogenesis). Together with a second page, the development of cellular life and microscopy is explained.

From The Lives of a Cell: Notes of a Biology Watcher by Lewis Thomas, Ph.D., 1974. "Man is imbedded in nature. The biologic science of recent years has been making this a more urgent fact of life. The new, hard problem will be to cope with the dawning, intensifying realization of just how interlocked we are. The old, clung-to notions most of us have held about our special lordship are being deeply undermined." Amazon Books.

Lewis Thomas: Organelles as Organisms: We seem to be living through the biologic revolution, so far anyway, without being upheaved or even much disturbed by it. Even without being entirely clear about just what it is, we are all learning to take it for granted. It is a curious, peaceful sort of revolution, in which there is no general apprehension that old views are being outraged and overturned.

Chemistry and Biochemistry

Chemistry at Kimball's Biology. Includes acids and bases, bond energy, elements and atoms, hydrogen bonds, mixtures and compounds, parts per million (PPM), etc., prions, and more.

Molecules and Genetics : Biology 1060. These disciplines were unknown in Darwin's time. In fact, they only really developed during the last few decades. Until then, evolutionary relationships among organisms were based on anatomy, embryology, development and distribution, as noted above. Understanding enzymes, proteins, DNA and the genetic code now provides another independent TEST of evolutionary relationships.

OBB Atoms and Molecules : Two pages that explain the basics of chemistry necessary to under-standing of biological concepts and evolutionary theory. This is a primer, not an intensive course.

Biochemistry at Kimball's Biology. Includes ATP, Bioluminescence, Cellular respiration, Enzymes, Metabolism, Photosynthesis, The Urea cycle and more. See also my separate page for Biochemistry.

Diversity of Life

Diversity of Life at Kimball's Biology. Includes archaea, bacteria (eubacteria), endosymbiosis and the origin of eukaryotes, fungi, geologic eras, invertebrates, plants, taxonomy, vertebrates, viruses and more.

Major Groups of Living Things : Biology 1060. The Five-Kingdom System until very recently distributed living things among five kingdoms of life as follows: Monera, Protista, Fungi, Plantae, Animalia. This classification lumps all prokaryotes together in the Kingdom Monera. However, recent research on genetic and molecular structure indicates that one group, the Archaebacteria, are very different from all other prokaryotes.

OBB Biological Diversity and Classification : There are 10 pages that are extremely well presented with numerous colorful illustrations, cladograms and other graphics—all explained in plain language. See the entire series of pages or select individual topics from the website's Main Menu.

Ecology

Ecology at Kimball's Biology. Includes acid rain, air pollution, biological control of pests, carbon and nitrogen cycles, food chains and food webs, freshwater and marine ecosystems, ozone, population biology and the human population, symbiosis and more.

Conservation Biology : The Conserving Earth's Biodiversity CD-ROM is an entirely new way to study and teach conservation biology and environmental science. Features Edward O. Wilson. (see Books by Wilson).

Population Ecology and Biological Diversity : These topics span three pages. See the entire series of pages or select individual topics from the website's Main Menu. As usual for the Maricopa.edu website there are great illustrations and easy to understand text.

The World Conservation Monitoring Centre provides information services on conservation and sustainable use of the world's living resources, and helps others to develop information systems of their own.

Bioinformatics for Biodiversity : From Science magazine, take a look at the emerging science of "biodiversity informatics" -- the efforts under way to make the vast, decentralized resources of global biodiversity information available in digital form, and the enormous challenge of imposing consistency and compatibility among the scores of searchable databases on the world's biota.

Embryonic Development

Embryonic Development at Kimball's Biology. Includes embryonic stem cells, extraembryonic membranes, germline vs. soma: and the biological significance of their distinction, homeobox genes: their role in embryonic development and more.

Developmental Biology : Web Resources has links to many other Developmental Biology sites on the Web. These links are grouped by model system. There are links to some of the Developmental Biology journals. Other pages have pictures, movies and animations of several Developmental processes.

More Developmental Biology: Anatomical Terms and Planes of Section, Gametogenesis, Cleavage, Gastrulation, Frog and Chick Embryo, Histology and Histogenesis, Regeneration, Glossary, Links.

Spermatology : Embryo & Sperm, reproductive biotechnology.

Dynamic Development at a Glance : A Virtual Embryo learning resource

Multi-dimensional Human Embryo : Three-dimensional image references of the Human Embryo based on magnetic resonance imaging. The collection of images is intended to serve students, researchers, clinicians, and the general public interested in studying and teaching human development.

Embryology Tutorials : Designed to provide supplementary material for teaching developmental biology to undergraduates. Tutorials covering the embryology of Zebrafish, Amphibians and Sea Urchins. Each contains a glossary and illustrates developmental stages such as fertilization, cleavage, gastrulation and patterning.

Sea Urchin Embryology : Spiky and rotund, an adult sea urchin looks more like a big, wet cocklebur than one of our close kin. Yet the early stages of development are very similar in humans and urchins, which makes these marine echinoderms excellent subjects for labs on embryology.

Embryo Images : About 5 weeks after conception, we all looked a lot like an 11-day-old mouse embryo, right down to the flippers and segmented tail. Students who need to know the intricacies of how we go from fins to fingers should visit this thorough guide to normal and abnormal mammalian development.

Zygote: Developmental Biology : You do not have to have a copy of Developmental Biology (Fifth edition) published by Sinauer Associates, to play here. A fantastic website.

Ernst Haeckel and the Biogenetic Law : Eventually, the Biogenetic Law had become scientifically untenable. (The revolt against this law started in the mid-1890s by the British embryologist Adam Sedgwick, who noted the accumulation of exceptions to this rule and was able to reinterpret older results without recourse to it. See this page for Haeckel's drawings. Also see Ernst Haeckel's Art. Early artwork in biology was beautiful. This website, although in German, offers visual delights.

Evolution

Evolution at Kimball's Biology. Includes evolution and adaptation, the Hardy-Weinberg equilibrium, Hominoids, abiotic synthesis of organic molecules, polymorphisms and speciation. This is basic information covered in greater depth elsewhere.

Evolutionary Biology : For Students and Teachers. Evolution is the unifying theory for all of Biology.

The Human Appendix : The appendix may be particularly important early in life because it achieves its greatest development shortly after birth and then regresses with age, eventually coming to resemble such other regions of GALT as the Peyer's patches in the small intestine.

Elementary Evolutionary Biology : Human Evolution, Population Genetics, Frequency Dependent Selection, Sexual Selection, Evolution of Sexual Reproduction, Molecular Clock, Mitochondrial DNA, Mimicry, Speciation, Cladistics, Major Histocompatibility Complex and Glossary

Evolution of Sexual Reproduction : Sexual reproduction is the favored way of many organisms. New combinations of genes can be assembled on the same chromosomes through recombination. Independent assortment during meiosis, which changes combinations of chromosomes, generates endless genetic diversity.

History of Evolutionary Biology : Named for a defunct genus of mammals, Lefalophodon introduces the early scientists who inspired, shaped, defended, and nurtured evolutionary biology. This who's who of biology profiles more than 50 thinkers who worked between 1800 and 1950.

Evolution of the Heart Over Time : The heart that now pumps blood through your body is a marvel of evolution which has taken millions of years to perfect. This is a brief account of how the organ changed from the exceedingly simple heart of a worm to the amazingly efficient, four chambered heart of a human.

General Science

General Science at Kimball's Biology Includes scientific methods and scientific papers. Although just two topics listed here, they are fundamental to the understanding of science—what it is and how science is done. Everyone should read this material.

What is a Species, and What is Not? : by Ernst Mayr. The biological species concept, is it adequate?

The Nature of Science and Biology : An introduction to the scientific method, development of theories, and ways in which science increases our understanding of the natural world and universe.

Biological Sciences Databases : From the National Laboratory for Applied Network Research, this is a very large catalong of websites in all the sciences (of which this is a link to 150 online Biological projects). Most of these sites will be for advanced students who can find the List of Disciplines here.

California State University Biological Sciences Web Server : This is a superlative collection of resources.

Genetics, DNA and RNA

 Genetics at Kimball's Biology. Includes crossing over and genetic recombination in meiosis, gene mapping with three-point crosses, Mendel's monohybrid crosses, one gene - one enzyme theory and transposons: jumping genes.

Molecular Biology and Evolution : A large archive (mostly technical papers) from 18 years of Journal.

Beginner's Guide to Molecular Biology : Students in biology will find this site useful. Teachers might find that the information covers some of the course material for the national curriculum (UK) for a level and gcses.

OBB Introduction to Genetics : Covers heredity, historical perspectives, the Monk and his peas, mutations, and terminology. Be sure to see the following pages on DNA and genetics from the website's Main Menu.

 DNA and RNA at Kimball's Biology. Includes recombination, repair and replication, base pairing, gene expression and gene therapy, the gentic code, genome sizes, mutations, restriction enzymes, transcription and much, much more.

Immunology

 Immunology at Kimball's Biology. Includes topics such as AIDS, allergies, antigens, asthma, B Cells and T Cells: lymphocytes of the immune system, cancer immunotherapy, monoclonal antibodies, regulatory T cells, vaccines and more.

Microbiology

Microbe of the Month : from Microbe Zoo at Mich. State Univ.

MicrobeLibrary.org : An educational program of the American Society for Microbiology

Microbiology Webbed Out : The microbiology textbook has been selected as a quality web site for current web contents by ISI. This is a prestigious award.

Profiles of Microorganisms: Microbes hold sway over such vital planetary matters as the composition of the atmosphere and the productivity of ecosystems. For students in beginning microbiology courses, this site teems with information on the ecological importance of bacteria and fungi.

Reviewed Microbiology Web Directory: Whether you're after a source of oceanic plankton samples or a primer on the acid-fast smear technique for spotting tuberculosis infection, you'll find it at Microbiology Direct. Links in 11 categories, from genomics to methods to teaching resources. Click on Research Topics, for subjects such as astrobiology, life in extreme environments, and quorum sensing (the ability of bacteria to assess the number of other bugs in their neighborhood).

Infection and Immunity: Over 25 clips and animations capture explosive bacterial growth, HIV reproduction, amoebas snarfing their prey, and other microbial dramas. There are also how-to pages on microbiology lab procedures such as viewing specimens with bright-field microscopy and inoculating agar plates.

Neurology — Brain Biology

Neurosciences on the Internet : Includes sites such as the Whole Brain Atlas, offering labeled CT, MRI, and other scans of the human brain. Online tutorials help learn about eye function or neuroanatomy.

Studying Neuroscience : means peering at grainy, gray brain slices. Bringing some relief to sore eyes is this 3D reconstruction of a human brain. The site offers a host of resources for teaching and research.

Primate Brain Information System : For neuroscientists baffled by the many alternative names given to similar central nervous system structures in different species, BrainInfo offers welcome relief. The site sorts out 6500 names and synonyms for about 860 structures and gathers information on them from databases.

Comparative Mammalian Brain Collections: Instead of row after row of jars, this online brain museum stocks images of whole brains of more than 100 mammalian species--from humans to dolphins to tree shrews--and stained thin sections for 15 species. Backgrounders cover topics such as brain nomenclature and how to infer the brain structure of extinct animals from impressions inside fossil skulls.

Neuroscience for Kids lists many animals that are venomous or toxic in some way. We all know that bees can sting and that some snakes and spiders are venomous. But did you know an octopus and some birds and fish are toxic too? The Pitohui are New Guinian birds recently found to have toxins on their skin and feathers. Some species of Puffer Fish , among others, require delicate handling during preparation as food for humans.

Synapse Web : Tiny junctions through which cells in the nervous system communicate, synapses are important sites of learning and memory in the brain. This website provides materials to aid in the study of brain and synapse structure and function, particularly at the ultrastructural level.

Physiology

Physiology at Kimball's Biology Includes aging, blood, bone, breathing, circulation, hearing. hormones, organs, the lymphatic system, metabolism, olfaction, pain, pheremones, sexual reproduction, touch, vision and much more.

OBB Animal Cells and Tissues : Twelve beautifully illustrated pages dealing with animal cells, tissues and organs. See the entire series of pages or select individual topics from the website's Main Menu.

Plant Biology

Plant Biology at Kimball's Biology. Includes angiosperm life cycle, asexual reproduction in plants, plant cells, chlorophyll, germination of seeds, the leaf, photosynthesis, roots, symbiotic nitrogen fixation, transpiration and more.

OBB Photosynthesis : A leaf may be viewed as a solar collector crammed full of photosynthetic cells. The raw materials of photosynthesis, water and carbon dioxide, enter the cells, and the products of photosynthesis, sugar and oxygen, leave. This is a highly illustrated and colorful presentation.

OBB Plants and Their Structure : There are a series of five pages dealing with plant biology. They are colorful presentations, nicely illustrated, and very informative. Be sure to see the following pages on DNA and genetics from the website's Main Menu.

Virology

Introduction To Molecular Virology : If one defines life from the bottom up, from the simplest forms capable of displaying attributes of a living thing, one that the only real criterion for life is the ability to replicate.

Retroviruses: An Online Textbook :

Rhinoviruses : From the Institute for Molecular Virology.

Viruses From Structure to Biology: Tracks the progress of structural virology from the first crystallization of tobacco mosaic virus in 1935 to modern efforts to banish polio. Six chapters relate key milestones, such as deciphering the structure of hemagglutinin, one of the proteins jutting from the surface of the influenza virus.

Virus Particle Explorer : Illustrates and describes icosahedral virus structures in the Protein Data Bank.

Virus Ultrastructure : MicroPhoto Library. The head of a dress-maker's pin can provide seating accommodation for five hundred million rhinoviruses (cause of the common cold)!

West Nile Virus Maps : Each week, the National Atlas includes a new series of maps from West Nile Virus surveillance activities led by the Centers for Disease Control and Prevention. There are three types of map services: online interactive maps, dynamic multimedia maps, and maps for printing and reproduction.

End of Polio : The site also describes the challenges of stamping out polio in its last strongholds in 10 Asian and African countries. Public health leaders hope to certify these places as disease-free by 2005 if enough money can be raised: The site invites visitors to donate.

Send suggestions, additions, corrections to Richard White at R. White
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Other scholars choose to divide natural sciences into life sciences, which study living things and include biology, and physical sciences, which study nonliving matter and include astronomy, geology, physics, and chemistry. Some disciplines such as biophysics and biochemistry build on both life and physical sciences and are interdisciplinary.Â Not surprisingly, the natural science of biology has many branches or sub-disciplines. Cell biologists study cell structure and function, while biologists who study anatomy investigate the structure of an entire organism. Those biologists studying physiology, however, focus on the internal functioning of an organism. Some areas of biology focus on only particular types of living things. Biology is the science of life and people who are engaged in it are called biologists. They study the secrets of living things. Their discoveries are of great value to all mankind. Biology tells us about our body: how it is constructed and how it functions. It gives us important information about other living things and how their lives affect mankind. Knowledge of biology will help you to keep healthy. It will be your guide in solving many of everyday living and scientific problems. Biologists made a great contribution to science. They increased our food supply, they developed new and better v

Biology is the "science of life." It is the study of living and once-living things, from submicroscopic structures in single-celled organisms to entire ecosystems with billions of interacting organisms; it further ranges in time focus from a single metabolic reaction inside a cell to the life history of one individual and on to the course of many species over eons of time. Biologists study the characteristics and behaviors of organisms, how species and individuals come into existence, and their interactions with each other and with the environment. The purview of biology extends from Biology literally means "the study of life". Biology is such a broad field, covering the minute workings of chemical machines inside our cells, to broad scale concepts of ecosystems and global climate change. Biologists study intimate details of the human brain, the composition of our genes, and even the functioning of our reproductive system.Â The classical science of their time was observational rather than experimental. Another ancient Greek philosopher, Aristotle developed his Scala Naturae, or Ladder of Life, to explain his concept of the advancement of living things from inanimate matter to plants, then animals and finally man. This concept of man as the "crown of creation" still plagues modern evolutionary biologists (See Gould, 1989, for a more detailed discussion). Institution: MITx. Subject: Biology & Life Sciences. Level: Introductory. Language: English.Â What you'll learn. How to describe the building blocks of life and how their interactions dictate structure and function in biology. How to predict genotypes and phenotypes given genetics data. How to explain the central dogma of molecular biology and convert DNA sequence to RNA sequence to protein sequence. How to use molecular tools to study biology. How to describe the principles of early sequencing as well as modern sequencing and the effects of these technologies on the filed of genomics. How to apply the principles of modern biology to issues in today's society. Meet the instru

Biology is a science, but what exactly is science? What does the study of biology share with other scientific disciplines? We can define science (from the Latin scientia, meaning knowledge) as knowledge that covers general truths or the operation of general laws, especially when acquired and tested by the scientific method. It becomes clear from this definition that the application of the scientific method plays a major role in science.Â Other scholars choose to divide natural sciences into life sciences, which study living things and include biology, and physical sciences, which study nonliving matter and include astronomy, geology, physics, and chemistry. Some disciplines such as biophysics and biochemistry build on both life and physical sciences and are interdisciplinary.