

Glossary

Adaptation a physical or behavioural feature of an organism that helps it to survive in its habitat

Agaric [ag-uh-rik or uh-gar-ik] a mushroom with gills

Alga (pl. **algae**) [al-ga; al-jee] a simple, flowerless green plant usually living in water

Annulus (see **ring**)

Antibiotic a drug that interferes with the growth of bacteria. Penicillin, made by mould, was the first antibiotic. Antibiotics are widely used in the prevention and treatment of infectious diseases.

Ascomycete [as-kuh-mahy-seet] a fungus that reproduces by making spores inside a sac-like structure called an **ascus**

Autodigestion self-digestion

Bacteria any of a large group of one-celled organisms that lack a cell nucleus; reproduce by fission or by forming spores; and in some cases cause disease

Basidiomycete [buh-sid-ee-oh-mahy-seet] a fungus that reproduces by producing spores on the outside of a club-shaped cell called a **basidium**.

Bioremediation the use of biological agents, such as bacteria, fungi, or green plants, to remove or neutralize contaminants, as in polluted soil or water. Bacteria and fungi generally work by breaking down contaminants such as petroleum into less harmful substances.

Bolete [boal-eat] a fleshy mushroom with a spongy layer of tubes underneath its cap

Button a young mushroom before it opens up

Cap the cap-like part of the fruiting body which supports the spore-bearing surface, also called the pileus

Carnivore a living thing that eats meat. Carnivores are primarily mammals, such as tigers and dogs but can also be plants, such as the Venus flytrap.

Cell wall the protective, rigid, outer layer of the cells of plants, fungi, and bacteria

Cellulose a compound composed of glucose units; it's a major constituent of wood and of plants' cell walls

Chitin [kahy-tin] a chemical found in the cell walls of fungi, as well as in the shells of lobsters and insects

Chlorophyll the green pigment found in plants that permits them to make their own food through photosynthesis

Citric acid a colourless translucent crystalline acid; derived by fermentation of sugar and used mainly in the flavouring of beverages, confections, and pharmaceuticals

Coprophilous [kuh-prof-uh-luh s] living or growing on dung, as certain fungi

Cup (also known as the **volva**) the sac-like cup or tissue surrounding the base of the stem after the veil has broken

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Cup fungi ascomycetous fungi that expose their hymenium in a wide concave fruitification; most common in the spring

Decomposers organisms that are responsible for breaking down organic matter into a simpler form and recycling nutrients into the soil

Dichotomous key [di-kot-uh-muhs] a key for the identification of organisms based on a series of choices between alternative characteristics

Dutch elm disease a disease of elm trees caused by the fungus *Ceratocystis ulmi*; it is spread by the European elm bark beetle and by the contact of the roots of healthy elms with those of infected trees. It produces brown streaks in the wood and results in the eventual death of the tree. No cure has been discovered, but prevention methods include the injection of insecticide into healthy trees and the destruction of all elms in infected areas.

Ecosystem all the living and non-living things in a certain area including air, soil, water, animals, and humans

Enzyme [en-zahym] any of various proteins originating from living cells and capable of producing certain chemical changes in organic substances by catalytic action, as in digestion

Eukaryotic single-celled or multicellular organisms whose cells contain a distinct membrane-bound nucleus.

Fairy ring an arc or circle of mushrooms

Fruiting body the part of the fungus where the spores are produced; typically called the mushroom

Fungophile someone who loves fungi

Fungophobia someone who fears fungi

Fungus (pl. **fungi**) [fuhng-guhs; fuhn-jahy, fuhng-gahy] one of the kingdoms of living things. They lack chlorophyll, have no true roots or stems, do not produce their own food and reproduce from spores

Germination the process whereby seeds or spores sprout and begin to grow

Gills plate-like structures on the under-surface of the cap of most mushrooms.

Glycogen [glahy-kuh-jen] a polysaccharide, molecularly similar to starch, constituting the principal carbohydrate storage material in animals and occurring chiefly in the liver, in muscle, and in fungi and yeasts

Habitat a place with a particular kind of environment suitable for the growth of an organism

Herbivore an animal that feeds chiefly on plants

Hypha (pl. **hyphae**) [hahy-fuh or hahy-fee] individual thread-like filament that forms the mycelium and fruit body. Hyphae secrete enzymes that digest food so that it can be absorbed by the fungus.

Kingdom the highest rank of the classification into which living organisms are grouped in Linnaean taxonomy, ranking above a phylum. There is debate as to whether there are 5, 6, or 7 kingdoms.

Lichen [lahy-kuh n] the symbiotic association of a fungus with an alga. The fungal component of a lichen absorbs water and nutrients from the surroundings and provides a suitable environment for the alga. The algae live protected among the dense fungal hyphae and produce carbohydrates for the fungus by photosynthesis.

Crustose crust-like lichens that may be buried in tree bark, or even between the crystals of rocks

Foliose flat leaf-like lichens

Fruticose miniature shrub-like lichens--one lichen of this type is the famous "reindeer moss" of Lapland

Squamulose scaly lichens made of numerous small rounded lobes, intermediate between foliose and crustose lichens.

Life cycle the complete life history of an organism from one stage (e.g.; the spore) to the recurrence of that stage. The life cycle of an agaric is: spore-->germination (hyphae)-->mycelium-->primordium -->button-->mushroom-->spore.

Mildew [mil-doo] any of various obligately parasitic fungi that form a superficial, usually whitish growth on living plants

Mould [mohld] a growth of minute fungi forming on vegetable or animal matter, commonly as a downy or furry coating, and associated with decay or dampness. Some moulds are added to food intentionally.

Mushroom the fruiting body of a fungus, typically containing a cap with spore producing gills resting on top of a stalk. The purpose of the mushroom is to manufacture and release spores.

Mycelium (pl. **mycelia**): [mahy-see-lee-uh m] a mass of hyphae (usually underground) that makes up the main body of the fungus

Mycologist a scientist who studies fungi

Mycology [mahy-kol-uh-jee] the scientific study of fungi

Mycorrhiza (pl. **mycorrhizas**): [mahy-kuh-rah-y-zuh / -zee] "fungus root"; the formation of a symbiotic

relationship with plant roots. The fungus obtains sugars from the plant, whilst the plant gains increased supplies of nutrients extracted from the soil by the fungus.

Nematode [nem-uh-tohd] unsegmented worms with an elongated rounded body which is pointed at both ends; mostly free-living but some are parasitic

Nutrient cycling all the processes by which nutrients are continuously transferred from one organism to another in an ecosystem. For instance, the **carbon cycle** includes uptake of carbon dioxide by plants, ingestion by animals, and respiration and decay of the animal by decomposers.

Omnivore an animal that feeds on both animal and vegetable substances

Organic matter anything that is or was once alive

Parasite an organism living in or on another living organism (host) from which it extracts nutrients

Parasitic mushroom/fungi a mushroom that lives on or feeds off a living animal or plant or another fungus

Penicillin (see **antibiotic**)

Photosynthesis the process in green plants and certain other organisms by which carbohydrates are synthesized from carbon dioxide and water using light as an energy source

Pores (also called **tubes**) hollow cylinders containing spores and forming the spongy underside of bolete and polypore caps

Potato blight any of various highly destructive fungus diseases of the potato

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Protozoa [proh-tuh-zoh-uh] any of a large kingdom of single-celled, usually microscopic, eukaryotic organisms, such as amoebas, ciliates, flagellates, and sporozoans

Primordium an aggregation of cells indicating the first trace of an organ or structure

Ring (also called an **annulus**) a circular skirt on a mushroom stalk formed by a broken veil

Rhizomorph [rahy-zuh-mawrf] a dense mass of hyphae forming a root-like structure characteristic of many fungi

Sac fungi (also called **Ascomycetes**) fungi that make their spores in sacs. This group of fungi includes single-celled bread yeast and multi-celled truffles. Other types of sac fungi can harm plants and animals.

Saprobic mushroom a mushroom that feeds off dead trees, dung, leaves, litter, or other organic matter

Scales raised pieces of broken skin on a cap or stalk surface

Sclerotium (pl. **sclerotia**) [skli-roh-shee-uh m; -shee-uh] a dense mass of branched hyphae, as in certain fungi, that contain stored food and are capable of remaining dormant for long periods (e.g., Canadian Tuckahoe)

Seed a mature fertilized plant ovule consisting of an embryo and its food source and having a protective coat; common to plants

Species the major subdivision of a genus, regarded as the basic category of biological classification, composed of related individuals that resemble one another, and are able to breed among themselves

Spore the reproductive unit of fungi, similar to the seed in plants. It differs from a plant

seed in that it does not have its own food reserves.

Spore case (also called **sporangium**) the part of mold that produces spores

Spore print the picture formed on paper by mushroom spores; the print's colour and pattern help in identification

Stalk (also called the **stem** or **stipe**) the part of the mushroom that holds up the cap; similar to the stem of a plant

Starch a carbohydrate, occurring in the form of minute granules in the seeds, tubers, and other parts of plants, and forming an important constituent of rice, corn, wheat, beans, potatoes, and many other vegetable foods

Symbiosis a relationship between two different organisms that is beneficial to both. (e.g. mycorrhizal fungi and plants; a fungus and an alga in a lichen).

Taxonomy the science of classification; the arrangement of organisms into groups based on their natural features

Toadstool a popular name for a poisonous mushroom

Toxin a poisonous substance

Tubes (see **pores**)

Universal veil the tissue that covers and protects a developing mushroom and that breaks as the mushroom grows

Volva [vol-vuh] (see **cup**)

Yeast a single-celled fungus such as Brewers' Yeast (*Saccharomyces cerevisiae*) used in brewing and baking.

Suggested Resources and Sources

TEACHING AIDS

How the Mushroom Got its Spots: An Explainers Guide to Fungi by Sue Assinder. British Mycological Society (BMS) and the Biotechnology and Biological Sciences Research Council (BBSRC). ISBN 0708406459

This guide is aimed at non-experts who want to tell children more about the fascinating world of mushrooms, toadstools, moulds and other fungi, and is useful for teachers, leaders of wildlife groups and science clubs. "How the mushroom got its spots" is available free from the British Mycological Society at www.britmycolsoc.org.uk. Additional BSM teaching materials can be found at www.fungi4schools.org

DSM II Fungi—Small Wonders (Grades 5-6). by N.H. Hudson Delta Science Module (DSM) series. Delta Education, 1994. ISBN 0875041094

Students compare various fungi with plants by extracting pigments to test for chlorophyll. They discover that fungi—with no seeds, roots, stems, leaves, or flowers—are in a class (actually, a kingdom) by themselves. They dissect mushrooms to investigate spore reproduction. Students also grow mold gardens in different cultures to test fungicides. Many activities focus on the one-celled fungi—yeast. Students observe yeast growth, budding, and fermentation (and yeast at work in pretzel dough) while controlling food and temperature variables. Based on activities and research, students debate the benefits and hazards of fungi. (12 Activities)

The Good, the Bad and the Fungi: Introducing Fungi to Children by Liz Holden. Field Mycology Volume 4(1), January 2003 pp 19-27 <http://www.britmycolsoc.org.uk>

If you are faced with a group of thirty 10 year olds and the task of trying to enthuse them about mycology, you might need some help. You can get it here!

GENERAL REFERENCE BOOKS

Magical Mushrooms, Mischievous Molds by George W. Hudler. Princeton, N.J. : Princeton University Press, c1998. ISBN 0691028737

Hudler's light-hearted approach to the subject of the impact of fungi on the human history is refreshing and will attract students and lay people who have some interest in this area. In this lively book, George Hudler leads us on a tour of an often-overlooked group of organisms, which differ radically from both animals and plants. Along the way the author stops to ponder the marvels of nature and the impact of mere microbes on the evolution of civilization. *Magical Mushrooms, Mischievous Molds* is full of information that will satisfy history buffs, science enthusiasts, and anyone interested in nature's miracles.

Slayers, Saviors, Servants, and Sex : an Expose of Kingdom Fungi by David Moore. New York : Springer, c2001. ISBN 0387951016 (alk. paper) ISBN 0387950982 (softcover : alk. paper)

SUGGESTED RESOURCES & SOURCES

In this highly entertaining book, mycologist Moore presents a fascinating and lively guide to the fungal kingdom. He explores their role in food and agriculture and their dual role as infectious agents and providers of the most potent antibiotics.

Fungi: Delight of Curiosity by Harold J. Brodie. Toronto ; Buffalo : University of Toronto Press, c1978.
ISBN 0802022898
ISBN 0802067662 (pbk.)

Introductory Mycology by Constantine J. Alexopoulos. John Wiley & Sons, 1996
ISBN: 0471522295

This is a comprehensive mycology textbook that discusses the numerous activities of fungi that directly or indirectly impact other living things, including humans, in the context of their close relatives. It contains scores of illustrations, life cycle drawings, tables and new photographs.

Fungi: Folklore, Fiction and Fact by WPK Findlay. Richmond Publishing Company. London, 1982

Provides a historical background for those interested in mushrooms.

Mushrooms : a Separate Kingdom by Loni Parker. Birmingham : Oxmoor House, 1979.
ISBN 0848705017

Fungi by Roy Watling. Washington, D.C. : Smithsonian Books, 2003.
ISBN 1588340821

Richly illustrated with high quality colour photographs, this text for general readers describes a wide variety of fungi. Coverage includes such topics as the importance of fungi to the larger ecosystem, the collection and preservation of specimens, and the scourge of "dry rot" in houses.

The Fifth Kingdom by Bryce Kendrick. Focus Publishing. R. Pullins Company; 3rd edition, 2001
ISBN 1585100226

This 3rd edition is a compact but comprehensive encyclopedia of all things mycological. It explores every aspect of the fungi, from aflatoxin to zoospores, with an accessible blend of verve and wit. The 24 chapters are filled with up-to-date information of classification, yeast, lichens, spore dispersal, allergies, ecology, genetics, plant pathology, predatory fungi, biological control, mutualistic symbioses with animals and plants, fungi as food, food spoilage and mycotoxins. (amazon.com)

In the Company of Mushrooms : A Biologist's Tale by Elio Schaechter. Harvard University Press; Reprint edition (October 30, 1998)
ISBN: 0674445554

Call them the foot soldiers of the forest floor. Unassuming and prolific, mushrooms clear a path for new life by expertly and efficiently recycling accumulated dead matter, from the tiniest leaf to the tallest tree. It may sound like a dirty, thankless job, but as microbiologist and author Elio Schaechter enthusiastically notes, we should be singing praises to the fungi of the Earth; without them, all but the tallest of creatures would be buried under a global blanket of decomposing matter. Schaechter is obviously fascinated by his subject, and his spirit is contagious, making *In the Company of Mushrooms* as entertaining as it is informative. Though the book serves as a guide to hunting, identifying, and classifying mushrooms--its primary aim is to convey the wonders of the fungi world and its essential function in nature. Along the way Schaechter discusses the history of the mushroom and its role in the diets and healing practices of both ancient and modern cultures. He also offers such delectable tidbits as the fact that fungi are more closely related to humans than plants on the evolutionary scale. Mycology has never been so engaging. (amazon.com)

FIELD GUIDES

Mushrooms of North America by Roger Phillips
 Boston : Little, Brown, c1991.
 ISBN 0316706124
 ISBN 0316706132 (pbk.)

Mushrooms of the Boreal Forest by Eugene F. Bossenmaier. Saskatoon : University Extension Press, University of Saskatchewan, c1997.
 ISBN 0888803559 (pbk.)

More than 200 species from Alaska to Minnesota, with full-colour photos and descriptions, are arranged by major groups to simplify identification. Sections on biology and ecology of wild mushrooms help readers learn which mushrooms are edible and which are poisonous.

Mushrooms Demystified : a Comprehensive Guide to the Fleshy Fungi by David Arora.
 Berkeley : Ten Speed Press, c1986.
 ISBN 0898150108

Simply the best and most complete mushroom field guide and reference book, with over 950 photographs. The text is extremely extensive and inclusive. Many of the photos are in black and white.

All That the Rain Promises, and More ... : A Hip Pocket Guide to Western Mushrooms by David Arora. Ten Speed Press (April 1991)
 ISBN: 0898153883

A concentrated form of *Mushrooms Demystified*. Great colour plates and fun myco-tidbits. A fantastic guide for kids to explore.

Mushrooms of Western Canada by Helene M. E. Schalkwijk-Barendsen. Later copies printed in 1994 have title: **Mushrooms of Northwest North America**. Edmonton, Alta. : Lone Pine Publishing, c1991.
 ISBN 0919433472 (pbk.)
 ISBN 1551050463 (pbk.)

CHILDREN'S BOOKS

Fungi by Jenny Tesar ; with illustrations by Wendy Smith-Griswold. Woodbridge, Conn. : Blackbirch Press, c1994.
 ISBN 1567110444

This award-winning series emphasizes the fascinating patterns in the natural world, enabling readers to discover their own place in the network of life.

Slime, molds, and fungi by Elaine Pascoe ; photographs by Dwight Kuhn. Woodbridge, Conn. : Blackbirch Press, 1999.
 ISBN 1567111823

Using hands-on natural science projects, explores and explains different types and characteristics of fungi.

Fungi by Charles Murray Rotter.
 Mankato, Minn. : Creative Education, c1994.
 ISBN 0886825938

Introduces the fungi kingdom, discussing the varieties, physical structure, and reproduction, and well as the fungi's role in the ecosystem, and human uses of fungi.

What is a fungus? by D.M. Souza
 New York : Franklin Watts, c2002.
 ISBN 0531119793 (lib. bdg.)
 ISBN 0531162230 (pbk.)

The plant and fungus kingdoms are richly diverse and filled with fascinating organisms. This series covers both basic and little-known facts about plant and fungus biology, including reproduction, structure, and species variation. Readers learn about unusual species and their habitats, as well as threats to their existence. Also covered are the ways in which plants and fungi are important in human life--as medicines, sources of food and clothing, and items of unsurpassed beauty.
 *This is a quality book and highly recommended.

SUGGESTED RESOURCES & SOURCES

Discovering Fungi by Jennifer Coldrey.
New York : Bookwright Press, 1988.
ISBN 0531181707

Introduces, in brief text and illustrations, the characteristics of fungi, where they may be found, the many varieties that exist, and their relationship to animals and human beings.

Fungi by Alvin, Virginia, and Robert Silverstein.
New York : Twenty-First Century Books, 1996.
ISBN 0805035206

Introduces fungi, discussing their varieties, physical structure, reproduction, role in the ecosystem, and uses.

*This book is also highly recommended!

Molds and Fungi by Buffy Silverman.
San Diego : Kidhaven Press, c2005.
ISBN 0737720751

Molds and other fungi live all over the world. Despite the amazing variety of fungi, all are alike in important ways. This book describes the characteristics of the Fungi kingdom and portrays the life cycles of unusual and important fungi. The role of fungi in the food chain is explored, as is the impact of fungi on people. (amazon.com)
*This book has really nice photos and simple text. Its a very good introduction to the fungi.

Mushroom by Barrie Watts.
Morristown, N.J. : Silver Burdett Co., 1986.
ISBN 0382092872 (lib. bdg.)
ISBN 0382093011

Discusses the parts of mushrooms and how these fungi grow.

* This book has simple illustrations and good photos.

Carnivorous Mushrooms : Lassoing Their Prey? by Victor Gentle. Milwaukee : Gareth Stevens Pub., 1996.
ISBN 0836816560

Introduces some varieties of fungi that eat eel worms, describing the damage these tiny worms cause to both plants and animals and the different ways that the fungi trap their prey.
* This is a very cool book with great scanning electron micrographs (SEMs)!

Mushrooms of the World With Pictures to Color by Jeannette Bowers, David Arora. Dover Publications (July 1, 1984)
ISBN: 0486246434

92 fascinating mushroom species are revealed. Detailed captions accompany the ready-to-colour illustrations. Scientific and common names, countries of origin, and growing conditions are also included. List of Synonyms. Index. 39 black-and-white illustrations. (amazon.com)

A Young Persons Guide to the Fungi by Bryce Kendrick. Mycologue Pubns (June 1, 1986)
ISBN: 0969223714

"This delightful book combines humor and mycological expertise in a presentation that should capture the imagination. It will especially appeal to pre-teens, but will educate older children and adults as well. This is perhaps the best book available to junior mycologists in North America." (North American Mycological Association Bulletin)

"This is a remarkably simple, entertaining and informative book on fungi. Twenty-six pages of beautiful, full-page, black-and-white line drawings show all different kinds of fungi at their best. Each illustration is paired with a few paragraphs describing the fungus; enter the 'Tree-Eaters' and the 'Vegetable Caterpillar' to delight the curious mind. A wonderful natural science resource." (New York State 4-H Newsletter)

Magic School Bus Meets the Rot Squad: A Book about Decomposition Based on the TV Show. Scholastic Us (October 1995)
ISBN-10: 0590400231

The students in Ms. Frizzle's class embark on another journey when the Magic School Bus tours a decomposing log that introduces the latter end of the life cycle and teaches readers that there's more to rot than meets the nose.

Fungus Fred goes Foraying by Maggie Hadley. British Mycological Society, 2002. www.fungi4schools.org/KS2-3_resources.htm

This book tells an engaging story about how Fungus Fred investigates the different types of fungi in nature. The book is full of fungi facts and encourages children to do what Fred has done and have fun learning. Suitable for children in the age range 7-11 years. You can read the book online or you can also order a printed copy by mail from the website.

FICTION BOOKS

The Fungus That Ate My School by Arthur Dorros ; illustrated by David Catrow. New York : Scholastic Press, 2000. ISBN 0590477048

While the students are home for spring vacation, the fungus they are growing in their classroom grows and grows and takes over the entire school.

Mushroom in the Rain by Mirra Ginsburg. Aladdin; Reissue edition (April 1, 1997) ISBN: 0689714416

Caught out in the rain, an ant takes shelter under a very tiny mushroom. Soon, a wet butterfly, then a drenched mouse, a dripping sparrow, and even a rain-soaked rabbit each beg to join him under his miniature umbrella. How can the ant let the others in when there is barely room enough for one? But as the rain comes down and down, they all somehow manage to squeeze together and share the tiny shelter. And when the sun finally comes out, the ant discovers a magical secret of just what happens to mushrooms in the rain! (amazon.com)

FUN SITES FOR KIDS

The Fungus Among Us

<http://www.virtualmuseum.ca/~mushroom/English/index2.html>

Fun Facts About Fungi

www.herb.lsa.umich.edu/kidpage/factindx.htm

This page at the University of Michigan introduces students to the kingdom of fungi through games, puzzles and experiments.

RESEARCH

Tom Volk's Fungi

<http://www.tomvolkfungi.net/>

Canada's Species: Fungi

<http://canadianbiodiversity.mcgill.ca/english/species/fungi/index.htm>

WHERE TO FIND POSTERS

EDIBLE YARD, FIELD and Cultivated MUSHROOMS

by David Arora depicts numerous edible mushrooms which are cultivated, found on stumps, in open spaces or in back yards and gardens.

EDIBLE FOREST FLOOR MUSHROOMS by David Arora illustrates numerous edible mushrooms which can be found in the forest floor.

<http://www.gourmetposter.com/Mushroom.htm>
<http://www.gmushrooms.com/BOOKS.HTM>
<http://www.fungi.com/gifts/index.html>
http://www.art.com/asp/display-asp/_id--9338/Mushroom.htm
<http://www.edugraphics.net/gf-food/gf280.htm>