



Mushroom Growth

➤ MUSHROOMS, puffballs and other fleshy fungi multiply before our eyes as spring warms up and showers become more numerous. We never quite get over the feeling our great-grandfathers had, that there was something elfin, preternatural if not actually supernatural, about the sudden appearance of these strange growths. Yestereven they were not here; this morning they are all over the lawn like the tents of a fairy army; whence came they so suddenly, if the Little People didn't bring them?

Alas for our fancies, mushrooms and their kin do not grow as quickly as their sudden appearance might lead us to believe. Their real growth is, if anything, slower than that of most other kinds of plants, and always remains hidden.

You can get an idea of this hidden growth by carefully running your fingers into the loose mold of the forest floor where mushrooms are growing and lifting some of it gently, along with a mushroom or two. From the base of the stalk you will find white cottony strands running out, rapidly branching

and re-branching like roots, only not nearly as strong as even the weakest roots. The ultimate branchlets are glistening white threads, which may even be so fine that a microscope is needed to detect them.

These threads are the real body of the mushroom; the conspicuous, curiously-shaped overground body is only a structure that produces the reproductive cells, the spores, and sows them on the wind for distribution. The underground threads are what feed on dead leaves and wood, on anything dead in the soil, and in some species even parasitically on other plants that are still living. These threads are known to botanists as hyphae; a mass of such hyphae is called a mycelium.

The mycelium grows and spreads sometimes for several years, with no sign above ground. Then, when conditions become right for reproduction, the "buttons" that will eventually become the fully expanded mushrooms begin to form, just beneath the surface. They are like embryos, with all adult

parts represented, but in small size and tightly packed. Finally, warmth and wetness induce them to take in water at a terrific rate. They expand accordingly, and thus pop up overnight. But the silent, unseen preparations for this dramatic event have always been a matter of long, slow preparation.

Science News Letter, April 24, 1948

Science Service Radio

➤ LISTEN in to a discussion on "The Future of the Nation's Health" on "Adventures in Science" over the Columbia Broadcasting System at 3:15 p.m. EDST Saturday, May 1. Mr. Oscar R. Ewing, Federal Security Administrator, will be the guest of Mr. Watson Davis, Director of Science Service. Mr. Ewing will discuss the purpose of the National Health Assembly, due to open the day of the broadcast.

Science News Letter, April 24, 1948

AERONAUTICS

Jet Planes Need Cooling

Some means of refrigeration is required to cool the pilot-cabins in fast jet-propelled airplanes, engineers are told.

➤ PILOT-CABIN cooling is necessary with jet-propelled aircraft capable of flight speeds of 500 miles an hour or over, the Society of Automotive Engineers was told by D. O. Moeller and O. Andrew Sanne of Stratos Corporation. Flight at speeds over the 600 miles-per-hour mark under extreme temperature conditions requires some means of refrigeration, they said, to make the cabin endurable for the crew members.

The heat comes from the outside of the plane—even when traveling high above the earth where the atmospheric temperatures may be well below zero Fahrenheit. It forms in the so-called boundary layer of air next to the plane which passes over the craft at a lower velocity than the outer air. It is due to the conversion of the kinetic energy of the air stream into heat. Part of this heat is dissipated to the air stream, they explained, but part passes to the cabin walls and raises the inside temperature.

In addition to this heat, there is also a heat input from electrical equipment,

crew members, and solar radiation. It is not surprising, therefore, they stated, that even at high altitudes operation of the cooling system is necessary.

In a jet-propelled plane equipped with an expansion-turbine type cabin cooling system, air taken from the jet-engine compressor is the source of cabin ventilation. Two systems of cooling the air are used, one a simple system, the other the so-called bootstrap method. In the simple system the air is cooled by passing through a heat-exchanger, which uses ram air as the cooling medium, then is cooled further by expansion through the turbine.

The bootstrap system utilizes two heat exchangers combined with a centrifugal compressor and an expansion turbine, they stated. The air taken from the engine is passed through the first heat exchanger and then is compressed in the centrifugal to an appreciably higher pressure. The air is cooled in the second heat exchanger and then is finally cooled by expansion in the turbine.

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The ever-increasing speeds of military aircraft will require that planning and development of cooling equipment keep

abreast of the aircraft requirements. The development of high air speeds and better cooling systems should be parallel.

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Books of the Week

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AMERICAN UNIVERSITIES AND COLLEGES—A. J. Brumbaugh, Ed.—*American Council on Education*, 1054 p., \$8.00. A Directory giving full information on 820 accredited institutions.

THE ART OF CHINESE PAPER FOLDING FOR YOUNG AND OLD—Maying Soong—*Harcourt, Brace*, 132 p., illus., \$2.50. Instructions and diagrams for making a variety of amusing and useful objects from paper, without use of scissors or paste.

BEE'S WAYS—George DeClyver Curtis—*Houghton Mifflin*, 240 p., illus., \$2.75. Amusing reading, useful for beekeepers or those who want to be—interesting to others.

BIBLIOGRAPHIC INDEX OF PERMIAN INVERTEBRATES—Carl C. Branson—*Geological Society of America*, 1049 p., \$9.50.

CHAMBERS' MINERALOGICAL DICTIONARY—*Chemical Publishing Co.*, 47 p., 40 colored pl., \$4.75. A convenient and beautiful book which would aid in the identification of stones.

CHEMICALS, HUMUS, AND THE SOIL: A Simple Presentation of Contemporary Knowledge and Opinions About Fertilizers, Manures and Soil Fertility—Donald P. Hopkins—*Chemical Publishing Co.*, 358 p., \$8.50. Intended for the man who works with the soil.

COLLOID CHEMISTRY—Robert J. Hartman—*Houghton Mifflin*, 2d ed., 572 p., illus., \$6.50. Not only for students of advanced chemistry but for students of other sciences who need a knowledge of this field.

ECONOMICS OF PERSONAL AIRPLANE OPERATION—W. J. Skinner—*Oregon State Engineering Experiment Station*, 46 p., illus., paper, 25 cents.

EVOLUTION OF THE HORSE BRAIN—Tilly Edinger—*Geological Society of America*, 177 p., illus., \$2.00.

A FIELD GUIDE TO THE BIRDS: Giving Field Marks of All Species Found East of the Rockies—Roger Tory Peterson—*Houghton Mifflin*, 2d rev. ed., 290 p., illus., \$3.50. A complete, authoritative book, but held to convenient pocket size. Contains flight silhouettes as an aid in identification.

A FIELD GUIDE TO THE SHELLS OF OUR ATLANTIC COAST—Percy A. Morris—*Houghton Mifflin*, 190 p., illus., \$3.50. If you are planning a vacation at the seashore, don't forget to tuck in this convenient little handbook.

FREQUENCY MODULATION: VOLUME I—Alfred N. Goldsmith and others, Eds.—*Radio Corporation of America*, 515 p., illus., \$2.50. A collection of technical papers of interest especially to scientists and engineers.

THE FREUDIAN PSYCHOLOGY AND VEBLEN'S SOCIAL THEORY—Louis Schneider—*King's Crown Press*, 270 p., \$3.25. Philosophers and political scientists may be interested in this unusual comparison.

GROWTH OF PLANTS: Twenty Years' Research at Boyce Thompson Institute—William Crocker—*Reinhold*, 459 p., illus., \$10.00. A critical summary of a wide variety of problems in plant research ranging from the storage of seeds to the control of color in potato chips.

INDUSTRIAL AND CITY WASTES—Fred Merryfield, W. B. Bollen, and F. C. Kachelhoffer—*Oregon State Engineering Experiment Station*, 56 p., illus., paper, 40 cents.

JET PROPULSION IN COMMERCIAL AIR TRANSPORTATION—Robert E. Hage—*Princeton University Press*, 91 p., illus., paper, \$1.50. An authoritative answer to the question, "Can jet propulsion, which has so revolutionized military aviation, be applied to advantage in civil air transportation?"

LIVING WITH SCIENCE—George W. Fowler, Morton C. Collister and Ernest L. Thurston—*Iroquois*, 544 p., illus., \$2.56. A general science text for the eighth year.

LOUIS PASTEUR—Laura N. Wood—*Messner*, 218 p., illus., \$2.75. The biography of a great scientist.

OVERFIRE JETS IN ACTION FOR SMOKE ABATEMENT—*Bituminous Coal Research, Inc.*, 16 p., illus., paper, 25 cents. For commercial and industrial stationary plants, railroads and steamboats.

THE MAN-EATING LEOPARD OF RUDRAPRANAG—Jim Corbett—*Oxford University Press*, 188 p., \$2.50. The story of a two-year hunt for an animal credited officially with killing 125 human beings.

THE MEANING OF WORDS: Analyzed Into Words and Unverbal Things, and Unverbal Things Classified into Intellections, Sensations and Emotions—Alexander Bryan Johnson with introduction by Irving J. Lee—*Chamberlin*, 256 p., \$3.00. Originally published in 1854, this book was a forerunner of semantics.

THE NEW BABY—Ruth and Harold Shane—*Simon and Schuster*, illus., 25 cents. A charming book in drawings and story intended help the young older brother or sister to enjoy the coming of the new addition to the family. Incidentally, the parents will find here useful hints on the handling of the situation to avoid hurt to the "Mike's" of this world.

PERSIAN ART AND DESIGN INFLUENCES FROM THE NEAR AND MIDDLE EAST—Arthur Upham Pope—*Studio*, illus., paper, \$2.00. Tracing the influence of Persian art in the modern world and on American textile and other design.

PREPARATION AND CHARACTERISTICS OF SOLID LUMINESCENT MATERIALS—Gorton R. Fonda and Frederick Seitz, Eds.—*Wiley*, 459 p., illus., \$5.00. A collection of important technical papers.

SOIL CONSERVATION: An International Study—Mark Baldwin and others—*FAO*

(*Columbia University Press*), 189 p., illus., paper, \$2.00. To help prevent the annual loss of millions of acres of farm, forest and range lands which now are the toll of erosion.

POPULAR MECHANICS OUTDOOR SPORTS MANUAL: 220 Helpful Hints for the Fisherman, Hunter, Camper, Trapper, Archer and Boatman—Editors, *Popular Mechanics Magazine*—*Popular Mechanics Press*, 158 p., illus., \$2.00.

TAKING THE CURE: The Patient's Approach to Tuberculosis—Robert G. Lovell—*Macmillan*, 93 p., illus., \$2.00. Practical advice written by a physician who was also himself a victim of tuberculosis. Entertaining as well as useful reading.

A TREASURY OF AMERICAN SUPERSTITIONS—Claudia de Lys—*Philosophical Library*, 494 p., \$5.00. A large collection of old superstitions or sayings.

UNITED STATES ASSOCIATIONS IN WORLD TRADE AND AFFAIRS—Office of Domestic Commerce—*Govt. Printing Office*, 125 p., illus., paper, 30 cents. Directory of 900 organizations which have a special interest in foreign trade, international affairs or world peace. Also text and statistics on the foreign trade of the U. S. and other nations.

THE USE OF AIRCRAFT IN THE CONTROL OF MOSQUITOES—*American Mosquito Control Association*, 46 p., 45 pl., paper, 75 cents. Information on when, where, and how aircraft may properly be used to distribute insecticides, especially DDT.

THE WORLD BOOK ENCYCLOPEDIA, 1948 ANNUAL SUPPLEMENT—J. Morris Jones, Ed.—*Quarrie*, 224 p., illus., paper, \$1.00. Reviewing important events of 1947.

WORLD WORDS: Recommended Pronunciations—W. Cabell Greet—*Columbia University Press*, 2d rev. ed., 608 p., \$6.75. A way of pronouncing the names in the news, including Japanese and Chinese places, originally developed for the use of broadcasters.

YOU AND YOUR DOCTOR: A Frank Discussion of Group Medical Practice and Other Modern Trends in American Medicine—Benjamin F. Miller—*McGraw-Hill*, 183 p., \$2.75. A book for laymen intended to give him the background for an understanding of this difficult and important problem.

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Charles

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