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ABSTRACT

Sources to assist junior and senior high school students and teachers in planning, preparing, and executing science fair projects in the biological science are cited here, as well as a few books with experiments suitable for elementary grade students.
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SCIENCE PROJECTS IN BIOLOGY Compiled by Constance Carter and Alana Wilson

TB 93-6

December 1993

SCOPE Sources to assist junior and senior high school students and teachers in planning, preparing, and executing science fair projects in the biological sciences are cited here, as well as a few books with experiments suitable for elementary grade students. Sources in other areas of science are listed in *Science Fair Projects* (LC Science Tracer Bullet 91-12), *Space Science Projects* (LC Science Tracer Bullet 92-7) and *Environmental Science Projects* (LC Science Tracer Bullet 90-2).

SUBJECT HEADINGS used by the Library of Congress, under which books on science projects in the biological sciences can be located in most card, book, and online catalogs, include the following:

- BIOLOGY--EXPERIMENTS (Highly relevant)
See also subdivision EXPERIMENTS under headings of particular interest, such as ANIMALS--EXPERIMENTS; INSECTS--EXPERIMENTS; MICROSCOPY EXPERIMENTS; PLANTS--EXPERIMENTS
- BIOLOGY PROJECTS (Highly relevant)
- BOTANY--EXPERIMENTS (Highly relevant)
- BOTANY PROJECTS (Highly relevant)
- ECOLOGY--EXPERIMENTS (Highly relevant)
- GARDENING--EXPERIMENTS (Highly relevant)
- NATURAL HISTORY PROJECTS (Highly relevant)
- SCIENCE PROJECTS (Highly relevant)
- ZOOLOGY PROJECTS (Highly relevant)
- NATURAL HISTORY--OUTDOOR BOOKS (Relevant)
- NATURAL HISTORY--STUDY AND TEACHING (SECONDARY) (Relevant)
See also subdivision STUDY AND TEACHING (SECONDARY) under headings of particular interest, such as BIOLOGY--STUDY AND TEACHING (SECONDARY); BOTANY--STUDY AND TEACHING (SECONDARY); ECOLOGY--STUDY AND TEACHING (SECONDARY)
- NATURE STUDY (Relevant)
- BIOLOGICAL SPECIMENS--COLLECTION AND PRESERVATION (Relevant)
- BIOLOGY--FIELD WORK (Related)

SE054658



BASIC TEXTS

- Bellamy, Mary Louise. *Biology discovery activities kit: lessons, labs, and worksheets for secondary students*. West Nyack, N.Y., Center for Applied Research in Education, c1991. 231 p. QH316.4.B44 1990
An excellent source for activities with detailed directions for preparation and teaching, a list of goals, and reproducible student worksheets. High school level.
- Bleifeld, Maurice. *Botany projects for young scientists*. New York, F. Watts, c1992. 144 p. QK52.6.B54 1992
Activities and experiments involving plants, exploring such areas as photosynthesis, plant structures, and growth.
- Bonnet, Robert L., and Dan Keen. *Botany: 49 more science fair projects*. Blue Ridge Summit, Pa., TAB Books, c1991. 144 p. QK52.6.B64 1990
Experiments and projects in botany, focusing on germination, vegetative reproduction, hydroponics, photosynthesis, and plant stimulation, transport, and dispersal. Junior high and high school levels.
- Bonnet, Robert L., and Dan Keen. *Environmental science: 49 science fair projects*. Blue Ridge Summit, Pa., TAB Books, c1990. 124 p. QH541.24.B66 1990
Suggests projects suitable for the classroom or a science fair.
- Rainis, Kenneth G. *Nature*. New York, F. Watts, 1989. 142 p. QH55.R35 1989
Nature projects and experiments exploring the five kingdoms of life, from bacteria to plants and animals.
- Rybolt, Thomas R., and Robert C. Mebane. *Environmental experiments about life*. Hillside, N.J., Enslow Publishers, c1993. 96 p. QH541.24.R93 1993
Uses experiments to explain ecosystems, life cycles, and interactions of life and environment including pollution and conservation.
- Tocci, Salvatore. *Biology projects for young scientists*. New York, F. Watts, 1987. 127 p. QH316.5.T63 1987
Bibliography: p. 122-124.
Biological science projects which demonstrate concepts and aspects of photosynthesis, genetics, plant and animal development, cell structure, and biochemistry.
- Ward, Alan. *Experimenting with nature study*. New York, Chelsea Juniors, c1991. 48 p. QH48.W28 1991
- VanCleave, Janice Pratt. *Biology for every kid: 101 easy experiments that really work*. New York, Wiley, c1990. 224 p. QH316.5.V36 1990
These experiments are unique in their ability to introduce biology concepts in a manner that makes learning exciting. Junior high level.

SPECIALIZED TITLES

- Court, Judith. *Ponds and streams*. London, New York, F. Watts, c1985. 32 p.
QH541.5.P63C65 1985
Investigates the plant and animal life found in ponds and streams and suggests related experiments and activities.
- Dashefsky, H. Steve. *Insect biology: 49 science fair projects*. Blue Ridge Summit, Pa., TAB Books, c1992. 165 p.
QL468.5.D37 1992
Provides background and instructions for various projects related to the behavior, ecology, life cycles, and physical characteristics of insects.
- Gates, Julie M. *Consider the earth: environmental activities for grades 4-8*. Englewood, Colo., Teacher Ideas Press, 1989. 198 p.
QH541.24.G38 1989
Bibliography: p. 183-193.
- Global issues education set*. Washington, Global Tomorrow Coalition, c1990. 119 p.
Environmental Science Projects Pamphlet Box <SciRR>
Based on the *Global ecology handbook*, this compilation provides activities and lesson plans to inform students at the primary and secondary levels (grades 3-12) about specific global issues such as biological diversity, tropical forests, sustainable development, ocean and coastal resources, and the biosphere.
- Harlow, Rosie, and Gareth Morgan. *175 amazing nature experiments*. New York, Random House, 1992. 172 p.
QH55.H3 1992
A collection of hands-on nature experiments, activities, and crafts.
- Hickman, Pamela M. *Birdwise: forty fun feats for finding out about our feathered friends*. The Federation of Ontario Naturalists. Reading, Mass., Addison-Wesley, 1989, c1988. 96 p.
QL676.2.H49 1989
Descriptive text, illustrations, questions, and suggested activities introduce information about birds in such areas as names of species, types of beaks, methods of nesting, birdwatching, and the feeding of birds.
- MacFarlane, Ruth B. Alford. *Making your own nature museum*. New York, F. Watts, 1989. 128 p.
QH70.A1M3 1989
Bibliography: p. 117-121.
Gives instructions for collecting, preserving, identifying, and displaying a nature collection.
- Milne, Lorus Johnson, and Margery J. G. Milne. *The mystery of the bog forest*. New York, Dodd, Mead, c1984. 127 p.
QH541.5.B63M55 1984
Explains the origin of bogs, their special attractions, and the unique plant life to be found in them.

Roth, Charles Edmund. *The amateur naturalist: explorations and investigations*. New York, F. Watts, c1993. 139 p. QH55.R67 1993

Presents a variety of activities and projects to help the amateur naturalist explore the habits of common plants and animals.

VanCleave, Janice Pratt. *Janice VanCleave's microscopes and magnifying lenses: mind-boggling chemistry and biology experiments you can turn into science fair projects*. New York, Wiley, c1993. 100 p. QH278.V36 1993

Webster, David. *Dissection projects*. New York, F. Watts, 1988. 96 p. QL812.5.W43 1988

An introduction to dissecting animals; discusses instruments, techniques, and acquisition of specimens and provides instructions for the dissection of clams, squids, fish, and others, as well as specific parts such as a beef heart and calf eye.

Wellnitz, William R. *Science in your backyard*. Blue Ridge Summit, Pa., TAB Books, c1992. 118 p. Q163.W423 1991

Includes experiments involving plants, animals, and earth sciences that can be done close to home and that encourage the development of observation and measurement skills.

Wood, Robert W. *Science for kids: 39 easy plant biology experiments*. Blue Ridge Summit, Pa., TAB Books, 1991. 160 p. QK52.6.W66 1991

A collection of experiments and projects in botany, focusing on germination, vegetative reproduction, hydroponics, photosynthesis, and plant stimulation, transport, and dispersal.

CLASSROOM EXPERIMENTS AND ACTIVITIES

Beller, Joel. *Experimenting with plants: projects for home, garden, and classroom*. New York, Arco Pub., c1985. 154 p. SB454.3.E95B45 1985

Harlow, Rosie, and Gareth Morgan. *Energy and growth*. New York, Warwick Press, 1991. 40 p. QH316.5.M67 1991

Suggests experiments to investigate such aspects of life as food chains, hibernation, life cycles, and specialized food and habitats.

Hendrick, Robert. Biology, history & Louis Pasteur: a new approach to teaching science. *American biology teacher*, v. 53, Nov./Dec. 1991: 467-478. QH1.A275

Hillman, Lawrence E. *Nature puzzlers*. Englewood, Colo., Teacher Ideas Press, 1989. 152 p. QH51.H54 1989

Activities focus on concept and skill-building. Breaks down each activity into an initial question, background information, hypotheses, and additional activities. High school level.

Hogan, Kathleen. The maple trail: tap into a hands-on experience that leaves your students stuck on science. *Science and children*, v. 27, May 1990: 22-23.

LB1585.S34

Holley, W. Dennis. Liven up life science: studying live animals is an enjoyable alternative to traditional biology labs. It's easier than you think. *Science scope*, v. 14, Jan. 1991: 21-23. Pamphlet box <SciRR>

Klein, William J. *Learning under the sun*. Ames, Iowa State University Press, 1988. 386 p. QH53.K57 1988

A manual composed of discovery labs. A wide range of plants, animals, and environmental issues provides topics for labs and worksheets.

A revised edition is in press.

LaHart, David E. Squirrels: a teaching resource in your schoolyard. *Nature study*, v. 44, Dec. 1991: 20-22. Pamphlet box <SciRR>

Nature projects on file. The Diagram Group. New York, Facts on File, 1992. 1 v. (unpaged) QH55.N38 1992

Issued in loose-leaf format.

Pranis, Eve, and Jay Cohen. *Growlab: activities for growing minds*. Burlington, Vt., National Gardening Association, 1990. 307 p. Pamphlet box <SciRR>

An attempt to make science inviting and relevant to students' lives with activities that explore plant life cycles, examine plant diversity, and investigate the interdependence of plants and animals.

Sewall, Susan Breyer. *Hooked on science: ready-to-use discovery activities for grades 4-8*. West Nyack, N.Y., Center for Applied Research in Education, c1990. 202 p.

QH51.S48 1990

Over 60 exciting, easy-to-use activities to enrich and reinforce all areas of the general science curriculum--especially nature/natural history.

Wong, Ovid K. *Hands-on ecology*. Chicago, Children's Press, 1991. 126 p.

QH541.24.W66 1991

Presents activities to explore and emphasize ecology and to demonstrate practical ways of conserving the environment.

Young, Louise. Pond-ering the possibilities: you'll find endless options when you put a pond at the center of your science curriculum. *Science and children*, v. 27, May 1990: 18-19. LB1585.S34

BIBLIOGRAPHIES AND PROJECT INDEXES

Educators guide to free science materials. 1st- ed.; 1960- Compiled and edited by Mary H. Saterstrom. Randolph, Wis., Educators Progress Service. annual.

Q181.A1E3 <SciRR Desk>

Clewis, Beth. Books for the amateur naturalist: sources of experiments & activities for outdoor biology classes. *American biology teacher*, v. 54, Jan. 1992: 16-18.

QH1.A275

Johnson, Carolyn M. *Discovering nature with young people: an annotated bibliography and selection guide*. New York, Greenwood Press, 1987. 495 p.

Z5818.N36J64 1987 <SciRR>

In addition to substantial sections listing print and audiovisual materials for young readers and items for educators and parents, includes information about sources of reviews, educational and recreational programs, organizations and clubs, contests and assorted games, kits, puzzles, posters, and other supplies.

Kennedy, DayAnn M., Stella S. Spangler, and Mary Ann Vanderwerf. *Science & technology in fact and fiction: a guide to young adult books*. New York, Bowker, c1990. 363 p.

Z7401.K46 1990b <SciRR>

Pilger, Mary Anne. *Science experiments index for young people*. Englewood, Colo., Libraries Unlimited, 1988. 239 p.

Q182.3.P735 1988b <SciRR>

Indexes experiments and activities in 694 elementary and intermediate science books.

----- Update 91. Englewood, Colo., Libraries Unlimited, 1992. 133 p.

Indexes an additional 329 books.

Q182.3.P55 1992 <SciRR>

Science experiments on file: experiments, demonstrations, and projects for school and home. New York, Facts on File, c1989. 1 v. (loose-leaf)

Q182.3.S33 1989 <SciRR>

"All of the experiments were obtained from a select group of master teachers--winners and finalists of the prestigious Presidential Award for Excellence in Science Teaching, named by the National Science Foundation."

Intended as a resource for students, grades 6-12.

See also *More Science Experiments on File* (New York, Facts on File, 1991. 1 v. (loose-leaf) Q182.3.M67 1990), which offers 80 new projects for grades 3-12.

Science fair project index. 1960-1972. Compiled by the staff of the Science and Technology Division of the Akron Summit County Public Library; edited by Janet Y. Stoffer. Metuchen, N.J., Scarecrow Press, 1975. 728 p.

Q182.3.S34 1975 <SciRR>

----- 1973-1980. Edited by Science and Technology Division, Akron-Summit County Public Library. Metuchen, N.J., Scarecrow Press, 1983. 723 p.

Q182.3.S34 1975 Suppl. <SciRR>

----- 1981-1984. Edited by Cynthia Bishop, Deborah Crowe, Science and Technology Division, Akron-Summit County Public Library. Metuchen, N.J., Scarecrow Press, 1986. 686 p.

Q182.3.S34 1975 Suppl. 2 <SciRR>

----- 1985-1989. Edited by Cynthia Bishop, Katherine Ertle, Karen Zeleznik. Prepared by the Science and Technology staff of the Akron-Summit County Public Library. Metuchen, N.J., Scarecrow Press, 1992. 555 p.

Q182.3.S34 1975 Suppl. 3 <SciRR>

Science for children: resources for teachers. National Science Resources Center, Smithsonian Institution, National Academy of Sciences. Washington, National Academy Press, 1988. 176 p. Z5818.S3S38 1988 <SciRR>

Science project information index, 1973-1983. Edited by Alex Spence. Toronto, Infolib Resources, c1984. 282 p. Q182.3.S64 1984
Bibliography: p. 279-282.

The Second science project information index. Edited by Alex Spence. Toronto, Infolib Resources, c1986. 144 p. Science Fair Projects Pamphlet box <SciRR>
Bibliography: p. 141-144.

BOOK/FILM REVIEWS AND "BEST BOOK" SOURCES

Appraisal: science books for young people. v. 1- winter 1967- Boston, Children's Science Book Review Committee. Z7401.A63

Malinowsky, H. Robert. *Best science and technology reference books for young people.* Phoenix, Oryx Press, 1991. 216 p. Z7401.M277 1991 <SciRR>

Morrison, Philip, and Phylis Morrison. Science books for young people. *Scientific American*, v. 269, Dec. 1993: 132-137, 139. T1.S5

Outstanding science trade books for children in 1992. *Science and children*, v. 30, Mar. 1993: 26-35. Best Books Vertical file <SciRR>
The annotated list is a regular feature of the March issue.

Science books & films. v. 1- Apr. 1965- Washington, American Association for the Advancement of Science. Z7403.S33 <SciRR A&I>

Science books & films' best books for children, 1988-91. Maria Sosa, Shirley M. Malcolm, editors. Washington, American Association for the Advancement of Science, c1992. 300 p. (AAAS publication, 92-30H) Z7401.S362 1992 <SciRR>

Science & technology: a purchase guide for libraries. Pittsburgh, Carnegie Library of Pittsburgh, Science and Technology Dept., 1992. 168 p. Best Books Vertical file <SciRR>

Published annually since 1963, this is an annotated bibliography of new books in science, technology, consumer medicine, and related subjects intended primarily for the general adult reader. A special feature is the selection of books for libraries which buy only 50-100 titles each year.

Wolff, Kathryn, Susan M. O'Connell, and Valerie J. Montenegro. *AAAS science booklist, 1978-1986.* Washington, American Association for the Advancement of Science, 1986. 568 p. (AAAS publication, 85-24) Q181.A1A68 no. 85-24 <SciRR>

ABSTRACTING AND INDEXING SERVICES. Students may need to use subject-oriented abstracting and indexing services for information on subjects related to their biology projects. Sample titles are listed below. Some of these may be available only in large or specialized libraries. A reference librarian may be able to suggest additional titles.

Applied Science & Technology Index (1913-)
Biological Abstracts (1926-)
Biological & Agricultural Index (1916-)
Biology Digest (1974-)
Ecological Abstracts (1974-)
Ecology Abstracts (1975-)
General Science Index (1978-)
Environmental Periodicals Bibliography (1972-)
EPA Publications Bibliography (1977-)
Readers' Guide to Periodical Literature (1900-)
Wildlife Review (1935-)
Zoological Record (1864-)

JOURNALS that often contain articles relevant to science fair projects in biology are

Audubon QL671.A82
American Biology Teacher QH1.A275
Defenders S960.D43
Environment UF767.S33
Journal of College Science Teaching Q183.U6J68
Journal of Geological Education QE40.J6
Learning LB5.L43
National Wildlife S964.U6N35
Nature Study QH81.N33
Ranger Rick's Naturescope WMLC L83/4136 Ser
Science Activities Q181.A1S29
Science and Children LB1585.S34
Science is Elementary Q181.A1S364
Science News Q1.S76
Science Scope Not in LC Collections
Science Teacher Q181.S38
Scientific American T1.S5

See particularly "Amateur scientist" feature which appears each month.

REPRESENTATIVE JOURNAL ARTICLES

Callison, Priscilla L., and Emmett L. Wright. Wanted: schoolyard plants. *Science activities*, v. 29, fall 1992: 8-13. Q181.A1S29

Carey, John. Science in a tub. *National wildlife*, v. 25, June/July 1987: 32-35.
Tells how to build simple backyard ponds for ecological studies. S964.U6N35

- Carlson, Patricia. Environmental investigations: the science behind the headlines. *Science teacher*, v. 60, Feb. 1993: 34-37. Q181.S38
- Cooke, Ron C. Cloning--maximizing your mediums: recipes for growth. *Science teacher*, v. 60, Nov. 1993: 43-45. Q181.S38
- Figueroa, Edna. Ecoprojects. *Science teacher*, v. 57, Feb. 1990: 36-38. Q181.S38
- Goh, Ngoh-Khang, Yoke-Kum Wan, and Lian-Sai Chia. Simply photosynthesis. Try this simple experiment to help children understand how plants make food. *Science and children*, v. 31, Sept. 1993: 32-34. LB1585.S34
- McLure, John W. Quest activities in the natural sciences. *Science activities*, v. 28, fall 1991: 8-11. Q181.A1S29
- Motten, Alexander F. A simplified experimental system for observing pollen tube growth in styles. *American biology teacher*, v. 54, Mar. 1992: 173-176. QH1.A275
- Schneider, Mike. Setting up an outdoor lab. *Science and children*, v. 21, Jan. 1984: 17-20. LB1585.S34
- Strauss, Richard T., and Mable B. Kinzie. Hi-tech alternatives to dissection. *American biology teacher*, v. 53, Mar. 1991: 154-158. QH1.A275
- Swarthout, Flora L. The compost community: a closer look. *Science teacher*, v. 60, Oct. 1993: 45-47. Q181.S38
- Texley, Juliana. Bait-shop biology. *Science teacher*, v. 60, May 1993: 23-25. Q181.S38

SELECTED MATERIALS available in the Science Reading Room pamphlet boxes include:

- Bohnsack, Charles W. Investigating the boron requirement of plants. *American biology teacher*, v. 53, Nov./Dec. 1991: 486-488.
- Hershey, David R. Digging deeper into Helmont's famous willow tree experiment. *American biology teacher*, v. 53, Nov./Dec. 1991: 458-460.
- May, Robert M. How many species are there on Earth? *Science*, v. 241, Sept. 16, 1988: 1441-1449.
- Olien, Rebecca. Worm your way into science: experiments with these familiar creatures promote a better understanding of the natural world. *Science and children*, v. 31, Sept. 1993: 25-27.
- Smith, Marian. Plant growth-responses to touch--literally a 'hands-on' exercise! *American biology teacher*, v. 53, Feb. 1991: 111-114.

Smith, Rosemary J., and Joel S. Brown. A practical technique for measuring the behavior of foraging animals. *American biology teacher*, v. 53, Apr. 1991: 236-242.

Stubbs, Harriett S. Acid rain: science projects. *Science activities*, v. 26, Feb./Mar. 1989: 28-30.

Swarthout, Flora L. The science of composting: become an aerobic instructor. *Science teacher*, v. 60, Sept. 1993: 27-29.

Zipko, Stephen J. Tanning turtles: an activity for observing animal behavior. *Science activities*, v. 29, fall 1992: 17-20.

ADDITIONAL SOURCES OF INFORMATION

Multimedia Resources

Annual Reference Catalog for Optics, Science Education

Annual Science Fair Issue

Edmund Scientific Co.

101 E. Gloucester Pike

Barrington, NJ 08007-1380

Telephone: (609) 573-6260

Items include microscopes, prepared slides, and science discovery kits (ant farms, nature labs).

Biology/Science Materials Catalog

Carolina Biological Supply Co.

2700 York Road

Burlington, NC 27215

Telephone: (800) 334-5551

Excellent source for models, games, charts, review sheets, and living and preserved specimens. Also publishes *Carolina Tips*, a brief "newsletter" containing laboratory activities. Free to those who telephone to be placed on mailing list.

National Geographic Educational Services Catalog

National Geographic Society

Educational Services

Department 91

Washington, DC 20036

Telephone: (800) 368-2728

Resources such as videos, films, filmstrips, books, and teacher's guides cover subjects on biology, nature study, and science.

PBS Video Resource Catalog

PBS Video

1320 Braddock Place

Alexandria, VA 22314-1698

Telephone: (800) 424-7963

Lists educational videos on the subjects of biology, the environment, and health science.

Teacher's Laboratory Catalog
Teacher's Laboratory, Inc.
P. O. Box 6480
Brattleboro, VT 05302-6480
Telephone: (802) 254-3457

Lists books and activity kits for the junior high student.

Ward's Biology
Ward's Natural Science Establishment, Inc.
P. O. Box 92912
Rochester, NY 14692-9012
Telephone: (800) 962-2660

A necessary resource for biology teachers. A complete source for instructional media and equipment for the classroom and the laboratory.

Organizations

Charles Edison Fund
101 South Harrison Street
East Orange, NJ 07018
Telephone: (201) 675-9000

Distributes teaching materials that contain experiments of interest to science fair enthusiasts.

Environmental Protection Agency
Public Information Center
401 M Street, SW PM211 B
Washington, DC 20460
Telephone: (202) 260-7751

Environmental Education Materials For Teachers and Young People is a free annotated list. Entries include diverse materials ranging from workbooks and lesson plans to newsletters, films, and computer software intended for young people.

Global Tomorrow Coalition
1325 G Street, N.W., Suite 915
Washington, DC 20005-3104
Telephone: (202) 628-4016

Publishes educational materials on global ecology and sustainable resources.

National Science Teachers Association
1840 Wilson Boulevard
Arlington, VA 20009
Telephone: (703) 243-7100

Publishes *Science Fairs and Projects*, *Science and Children*, *Science Scope*, and

Journal of College Science Teaching.

National Association of Biology Teachers, Inc.
11250 Roger Bacon Drive, Suite 19
Reston, VA 22090
Telephone: (703) 471-1134

A professional association with interests in biological science education, including aspects of classroom and laboratory instruction and facilities, and professional education of biology teachers at high school and college levels.

National Wildlife Federation
1400 16th Street, N.W.
Washington, DC 20036-2266
Telephone: (202) 797-6800

Publishes *National Wildlife*, *Ranger Rick's Nature Magazine*, *Ranger Rick's Naturescope*, and other publications of interest to students and environmentalists.

Science Service
1719 N Street, N.W.
Washington, DC 20036
Telephone: (202) 785-2255

Administers the International Science and Engineering Fair and the Westinghouse Science Talent Search.