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Photo by Case

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Tips on Visiting Zoos in the Bicentennial Year

EDWARD R. RICCIUTI
Author, ANSS Member

Increasingly in the past few years the nation's better zoos have assumed growing responsibilities in the field of environmental education. Zoo administrators have recognized that their institutions can offer a learning experience that is unique.

Live wild animals, which add a special vitality to lessons taught at the zoo, are only part of the story. Many of the animals in modern zoos live not in barren cages but in surroundings which, with varying success, simulate their natural habitats. Moreover, an important part of every modern zoo exhibit is an explanation of what it contains and why—graphics, film and other media are used to reinforce the message.

In addition, zoos have demonstrated their burgeoning interest in environmental education by establishing, or expanding their educational departments, which assist teachers in many ways. The larger zoos often have education staffs consisting of highly trained and motivated professionals; smaller zoos often have volunteers, which while not professionals, often are extremely knowledgeable and helpful.

All these facts mean that a visit to a zoo can be an exceptionally meaningful field trip for students. The bicentennial year, moreover, offers the chance to add a new dimension to a day spent at the zoo.

Most American zoos exhibit several species of significance in the nation's history, and these animals can be the focus of a field trip with a bicentennial theme. Among such creatures are the grizzly bear, bison, timber wolf, white tail deer, and the eastern gray squirrel. All of these species, moreover, have been drastically affected by the changes which human activities have wrought in the environment of North America since the first settlements were established here by Europeans.

The gray squirrel, for instance, was both a pest and a staple food of early settlers in the wilderness. Although it is common today, the present populations of this species are but a fragment of the hordes that once lived in the virgin forests of the northeastern third of the nation. There was virtually an endless supply of squirrels and frontiersmen killed countless numbers of these arboreal rodents—both for the pot and because they consumed agricultural crops.

Because hitting a squirrel in the branches is difficult, the frontiersmen who hunted these animals became ex-

pert shots. Their weapons, in fact, were often called "squirrel guns." During the American Revolution and the War of 1812, the shooting skills developed to a large measure by hunting squirrels served the Americans well against the British. In a way it can be said that the gray squirrel helped win independence for the United States.

Given this background, students can be encouraged to discuss how the deforestation of North America has affected the squirrel. They might also discuss the adaptations that help the squirrels of today survive in an environment that has changed immeasurably since the days of the frontiersmen.

The grizzly bear serves as a good example of an animal that has not survived the disappearance of most of the North American wilderness. Much feared by the early mountaineers and trappers who ventured into the American west in the beginning of the last century, the grizzly requires vast tracts of territory to survive. It must have plenty of space between it and people.

Many of the reasons why the grizzly does not get along well with man will become obvious to students by watching these creatures in a zoo exhibit for several minutes. Encourage youngsters to read labels and other graphics that provide information on the bears and their way of life. A subject that might be introduced while students are observing the bears is the problem of maintaining grizzly bear populations in national parks utilized by large numbers of people.

On returning to the classroom, students can conduct a further examination of this problem, which threatens the survival of the grizzly below the Canadian border. An article on the subject in the January 1975 issue of AUDUBON magazine is a useful reference. The theme of the inquiry could be how the adaptations that help the survival of the grizzly in the wild hurt its chances in areas frequented by large numbers of people.

The story of the slaughter of the American bison is well known. What many students may not realize, however, is that the bison was saved by captive breeding, mostly in zoos. The American Bison Society, formed early in this century at the Bronx Zoo, deserves almost all of the credit for preventing the extinction of the bison. Many of the bison that were used to re-establish the species on western preserves, in fact, were from a captive herd at the Bronx Zoo.

Students could be asked to examine

the role of the bison in not only the ecology of the western plains and prairies, but in the forests of the east, where a woodland race of bison once lived. Students also could discuss the changes that have occurred in the ecology of the prairie since the vast bison herds vanished, and how the original herds contributed to the natural order of life on the prairie. The discussion might prompt students to find out what has happened to the prairie today, and what efforts are underway to preserve the little prairie environment that remains. In addition, it might be interesting for students to debate whether it ever would have been possible for 60 million bison to have been compatible with the cities, ranches and farms that now exist in the western states.

The hatred of the wolf was carried here by Europeans along with their other customs and beliefs. A little research by students will show that the war against the wolf began almost as soon as the first settlers entered the American wilderness. Bounties were offered for the wolf at the very beginning of colonization.

Many zoos exhibit wolves in outdoor exhibits. Watching these graceful wild canids in such surroundings can do much to gain sympathy for these magnificent creatures. After students view wolves they may be asked to compare their attitudes before and after seeing them. Among the questions that could provoke lively debate, and which might stimulate students to probe further into the issue are: Is the wolf's bad reputation justified? Can wolves and people get along? What is the role of the wolf in maintaining the balance of nature? How do human attitudes towards animals affect their survival?

Wolves were a major predator upon the white tail deer. The absence of wolves is one of the reasons why white tail deer are more numerous in many states today than when the first Europeans sailed for the Americas. That is not the only reason, however, for deer also have benefited from the way man has changed the landscape. Deer find much less food in unbroken forest than in an environment containing many interfaces. Moreover, deer in most states are managed as game animals. Students might be asked to discuss whether deer could survive as well if they were not managed. This might generate debate on whether management tends to create

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In My Timber Church

by GRACE V. SCHILLINGER

When I walked in the timber early last week the Mayapples (*Podophyllum peltatum*) were just unfolding their large umbrella leaves. Down in the deep hollows where I saw them, it was so beautifully quiet that it seemed as if I were in a church.

You may not believe this but I *heard* the Mayapples growing. In this special secluded valley, last year's oak leaves carpeted the ground in deep piles. At first I thought the sound I heard might be insects crawling through those dry leaves so I got down on my knees to look. Not a single bug did I see!

But as I knelt there in my Timber Church, the faint little growing noises continued. And when I got to my feet and looked down again, I just know those Mayapple leaves were larger.

If you're not one to believe in hearing flowers grow, I suppose you could just call it the tender movement of Mother Earth herself, stretching in enjoyment of that soft warmth in the timber hollow.

That same afternoon our daughter Carol and I rode along the roadside near their country place, looking for wild asparagus. We weren't very lucky because we found only three slender shoots. Then Carol said, "Drive on further and I'll show you one of my special mushroom places." Now, I realized that I was being treated royally, because how many times will someone share their secret mushroom hunting spots with you?

Carol and I climbed fences and hills and looked around the trees she knew so

well and we found lots of the edible morels, or sponge mushrooms. As we climbed the steep hills and looked down through the pale green leaves on the trees, it seemed as if we gazed through the green glass windows of a cathedral. This was another part of my timber church.

I was reminded that Sheila Burnford in her book "The Fields of Noon" calls mushroom hunting "the peaceful pursuit." It is true. How could anyone feel hateful or depressed while carrying a basket and tramping contentedly over hill and hollow hunting for these quiet little things? Here's an idea, too, for folks who want to lose weight — always pick them with your knees straight; it's fine for the waistline.

Old clothes are perfect for mushroom hunting because no doubt you'll go over your shoe tops in mud when crossing a bog, and when you're trying to hang

onto a steep hillside, it's comforting to just fall in a relaxed heap now and then.

Last week I'm sure I came across a fox's hole. It had fresh tracks all around it. I looked down into the deep hole but didn't see anything. At the entrance, small plants of wild bergamot (Bee Balm) grew and they'd been trampled recently because the definite minty smell was in the area. This plant grows pale lavender flowers and is a wild relative of the Monardo Mint in our flower garden, which has red flowers.

A pair of mourning doves flew quite close, their wings making a lovely whirring sound as they flew. They're called the wild Doves of the East in one of my bird books. They look like small brownish gray pigeons with sharply pointed tails. For years we've called these birds rain crows, and believed that their soft, mournful "coo-coo-coos" predicted rain.

How could they feel mournful with their entire timber floor covered with Dutchmen's breeches, violets and spring beauties?

If you'll hunt, you'll find a secluded timber church near your home where serenity will soothe you as well.

TIPS ON VISITING ZOOS

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an imbalance, and on the wisdom of favoring some animals over others. It might be provocative to ask students to compare the relationship between the white tail deer and the backwoods hunters of early America to that between the deer and the sport hunters of today.

Among the other North American animals which could lend a bicentennial theme to a zoo visit are the elk, coyote, cougar and, of course, the bald eagle. It is a good idea, before planning such a visit, to check with the zoo's education department, which may be able to provide printed materials which could be helpful. In addition, departments of education or visitor services or zoos will inform you about rules regarding visits by groups — such as where to park busses, special admission fees, where to obtain food or have a picnic lunch, and whether guided tours are available.



“. . . the Mayapples were unfolding their large umbrellas.”

Links with the Past . . .

History as Environmental Education

LAWRENCE H. BUELL

Executive Director, Institute for Environmental Awareness, Inc., Petersham, Massachusetts

At a time when the Bicentennial year is upon us, it is vital that Environmental Educators join in the celebration of our country's birth as well as take the opportunity to facilitate one of our basic objectives which is to interpret and share with others the world in which we live. The Bicentennial theme offers everyone a unique opportunity to develop a sensitivity and understanding of early America.

Beyond the pomp and ceremony surrounding the well publicized and documented Concord Bridge encounter and the Philadelphia meetings, there exist within each community and local region a great many "links with the past." It is not difficult to identify these "links with the past" and most Environmental Educators know the significance of using historical studies in their programs. Yet, the real challenge is how to present historical events, activities and people to make it possible to comprehend the relationships and environments of our nation's early story.

The first step in the re-creation of the past and developing a kinship to it is to accumulate all available resources. Such resources are found in the people, places and things indigenous to the region; historical societies, town and county records, library primary sources and oral history accounts are but a few sources of local information. Once the events, places, things and people have been identified the methods of interpreting and facilitating an understanding must be established. There are many history buffs, but only a few rare individuals have the ability to communicate the spirit and feeling of history. Two significant sources of methods of communicating our heritage are Freeman Tilden's *Interpreting Our Heritage* and John Merriam's, *The Living Past*.

History has often been communicated in the unexciting abstractions of battles and political elections. The basic understandings of education state that a person learns best when they can be directly involved in an experience. Thus, when designing historical programs there must be priorities of demonstration and participation. In an effort to learn with things rather than about things the Institute for Environmental Awareness, Inc., a non-profit education organization located

in Petersham, Massachusetts has developed a range of "hands on" activities and experiences that assist people of all ages and circumstances to appreciate and understand early American history.

The following are specific activities and experiences which have proved to be effective means of historical interpretation.

18th Century Homesteads

Taking clues from abandoned cellar holes which are located in maturing second growth forests of central New England, participants discover the design, structure and layout of the original homestead. The homesteads were built in the 1700's and were actively used in 1776. After much inquiry the present day explorers are shown pictures of the homestead as it was in 1888 and read letters which were written by family members many years before. The picture, which is mounted on hard board and covered with clear contact paper, is the vital link with the past. From this experience a range of concepts can be expanded from the construction of the center chimney to the social history of why the farm was abandoned.

Land Use

The early maps of an area which outline land use are also significant links with the 18th century. Land use can be determined through a series of proprietor maps and grant surveys which are usually on record in town or county. A series of map overlays can help portray the progression of the land use.

Forest and Plant Succession

Trees and plants were a significant part of colonial living. Many of the plants used for early food, clothing, medicine and shelter have long since lost their cultivation but are direct botanical connections with the early age. Old field apple trees, sugar maple stands, rhubarb plants and other surviving 'wild' plants can be traced directly to the 1770's.

Artifacts

The tools and equipment used during the early years in America can be reproduced and used by participants, which

gives each an appreciation of the skill, mastery and hard work associated with these artifacts. Most of these tools from the scythe to the oxen stone bolt can be reproduced and made strong enough to be used by students and adults. Artifacts placed in their natural surroundings at live historical museums such as Sturbridge Village can give people a greater sense of the place each item had in colonial America.

Primary Sources

There are many valuable historical sources to be found in journals, diaries and letters. These primary sources add intimacy and a personal touch to many of the historical events of early America. Students can be further motivated by searching for traces of primary sources in their own families and neighborhoods.

Colonial Families

One of the more successful programs in colonial interpretation occurred in an elementary school where the students K-6 were divided into groups according to the original family units of the town. A range of experiences were offered to each family unit with much time spent outside reconstructing the original family living site. Inside much research was done with reading materials and the folklore of the age. Many community members were brought in as resource people and facilitators with the family groups. The finale of the project was a live museum concept where the school children in their family units spent an entire day touring homes and places of historical interest within their own community.

Linking the past to the present is an exciting and significant challenge for Environmental Educators. If we are to meet the objectives of environmental interpretation and relate to the personality and experience of the public, we must improve our content and methods of sharing the human experience. We must be flexible, creative and learn to adapt our approaches to all populations in all localities; urban, suburban, and rural. We all have a responsibility to share our methods and techniques so that others may benefit and the quality of interpretation will continue to expand.

19th Century American Journals of Natural History

Compiled by RALPH W. DEXTER

Historian, American Nature Study Society, Kent State University, Kent, Ohio

Introduction

Every student of nature needs a key to the past. During the 19th Century dozens of journals of natural history, or publications including natural history, were founded. Many of them were short-lived, but even the ephemeral journals contain information of importance to those naturalists in search of historical records and to the historian of science. A selected list of the most important ones is given here. The chief sources of information have been: (1) Bolton, Henry C. 1898. A catalogue of scientific and technical periodicals, 1665-1895 (2nd ed.) Smithsonian Miscellaneous Collections 40:1-1247. (2) Meisel, Max 1924-29. A bibliography of American natural history. The pioneer century, 1769-1865. 3 vols. and (3) Burns, Frank L. 1915. A bibliography of scarce or out of print North American amateur and trade periodicals devoted, more or less to ornithology. Supplement to the Oologist 32(7): 1-32.

PART I. 1810-1875

A. A General Natural History

- The American Medical and Philosophical Register, 4 vols. 1810-13.
The Medical Repository of Original Essays and Intelligence relative to Physics, Surgery, Chemistry and Natural History, new series, 3 vols. 1812-14.
Proceedings of the Linnaean Society of New England (Boston), 1815-18.
Journal of the Academy of Natural Sciences of Philadelphia, 1817-66.
The American Journal of Science and Arts, 1820-79.
Annals of the Lyceum of Natural History of New York, 1824-67.
The Transylvania Journal of Medicine and the Associated Sciences, 8 vols., 1828-36.
The Cabinet of Natural History and American Rural Sports, 3 vols., 1830-34.
Transactions of the Albany Institute (N. Y.), 1830-93.
Monthly American Journal of Geology and Natural Sciences, 1831-32.
The Naturalist, 2 vols, 1831-32.
The Monthly American Journal of Geology and Natural Science, 1 vol., 1831-32.
Bulletin of the Historical and Natural Sciences, 7 nos., 1834.
The Advocate of Science and Annals of Natural History, 1 vol., 1834-35.
Transactions of the Geological Society of Pennsylvania, 1834-35.
Journal of the Essex County Natural History Society, 1836-52.
Boston Journal Natural History, 7 vols., 1837-63. Continued as: Memoirs Boston Natural History, 4 vols., 1866-95.
Proceedings of the Association of American Geologists and Naturalists, 1840-48.
American Quarterly Journal of Agriculture and Science, 1845-47.
Proceedings of the Cleveland Academy of Natural Science, 1845-59.
The Naturalist and Journal of Natural History, Agriculture, Education, and Literature, 1 vol., 1846.
Smithsonian Annual Reports, 1846.
Annual Reports of the N.Y. State Cabinet of Natural History, 1847-65.
Smithsonian Contributions to Knowledge, 1848.
Proceedings of the Essex Institute (Salem, Mass.), 1848-68.
Proceedings of the American Association for the Advancement of Science, 1849-1910.
Annals of Scientific Discovery, 1850-71.
The Annals of Science, 2 vols., 1852-53.
Proceedings of the California Academy of Natural Sciences, 1854.
Transactions of the Academy of Science of St. Louis, 1856.
Canadian Naturalist and Geologist, 8 vols., 1856-83.
Transactions of the Illinois Natural History Society (Bloomington), 1858-63.
Journal of the Elliott Society of Natural History (Charleston, S.C.), 1859-60.
Proceedings of the Portland Society of Natural History (Me.), 1862-69.

- Bulletin, Museum of Comparative Zoology, 1863.
Memoirs of the Museum of Comparative Zoology, 1864.
The American Naturalist, 1867.
The Bowdoin Scientific Review, 2 vols., 1870-72.
Year-book of Nature and Popular Science for 1872, 1 vol., 1873.
Our Animal Friends, 1873-82.
American Field, 14 vols., 1874-78. Continued as: The Chicago Field, 1878-1881.
The Observer of Nature, 3 vols., 1874-76.
The Cincinnati Quarterly Journal of Science, 2 vols., 1874-75.
The Scientific Monthly, 2 vols., 1875-76.
Field and Forest, Bulletin of Potomac-side Naturalists Club, 3 vols., 1875-78.

B. Microscopy

- American Journal of Microscopy, 1 no., 1871.
The Lens, 2 vols., 1872-73.
The American Journal of Microscopy and Popular Science, 6 vols., 1875-81.

C. Botany

- The American Botanical Register, 3 nos., 1825-30.
The Botanic Investigator, 1 vol., 1835.
Magazine of Horticulture and Botany, 1835-65.
The Botanic Luminary, 2 vols., 1836-38.
The Botanic Advocate and Journal of Health, 3 vols., 1836-39.
The American Botanical and Horticultural Magazine, 8 vols., 1842-1849.
American Botanist and Florist, 12 issues, 1870.
Botanical Bulletin, 1 vol., 1875. Continued as: The Botanical Gazette, 1876.

D. Entomology

- Proceedings of the Entomological Society of Philadelphia, 1861-67. Continued as: Transactions of the Entomological Society of America, 1867.
The American Entomologist, 1868-69. Continued as: The American Entomologist and Botanist, 1869-70.
Record of American Entomology, 2 vols., 1868-69.
The Canadian Entomologist, 1868.
Psyche, 1874.

E. Conchology

- American Journal of Conchology, 7 vols., 1865-71.

F. Ornithology

- The Canadian Ornithologist, 1 no., 1873.
The Oölogist, 5 vols., 1875-80.
The Oölogist, 5 vols., Oölogist, 1875-93.

PART II. 1876-1900

A. General Natural History

- Journal of Science, 1876-1881.
The Aquarium Journal, 1876.
Studies from the Biological Laboratory of the Johns Hopkins University, 1877-93.
The Naturalist Agency Monthly Bulletin, 1877. Continued as: The Naturalists Leisure Hour and Monthly Bulletin, 1878-93.
Science Observer, 1877.
Field and River, 1877-82.
Science News, 1878-79.
The Valley Naturalist, 1878-80.
American Journal of Science, 1880.
The Naturalists Quarterly, 1880.
Science Advocate, 1880-82.
The National Scientific Journal, 1881-82.
The Canadian Sportsman and Naturalist, 1881-82.
The Collector, 1881-82.

Archaeology plus Ecology plus Students . . . Equals: American Indian Nature Trail

EDMUND K. SWIGART

President, American Indian Archaeological Institute, Washington, Connecticut

"Welcome to a loop walk that should give you a perspective of the northeast Woodland Indian's relation with this land during the Growing Season. Watch for numbered markers along the path which is relatively level and dry. Since native Americans had to contend with all seasons, with both surpluses and scarcities, we should also experience the environment they knew during the autumn harvest season and the difficult winter season for which there will be separate guides.

"You are now walking through an Oak Hickory forest typical of upland Connecticut areas. Surrounding you are not only tall canopy trees, but also the shorter 'understory' trees, the thick shrub layer, and the varied non-woody herbs close to a thick moist leafy humus. Liv-

ing in the midst of this forest are the songbirds, squirrels, rabbits and other creatures familiar to all of us.

"But the first people in Connecticut, probably over 12,000 years ago, saw, and heard, and felt, and smelled a very different environment; and their successors experienced yet others. Each group of people adapted in their own way to the world they lived in. THIS IS THE STORY OF THE AMERICAN INDIAN NATURE TRAIL."*

The Challenge

Today we face a unique dual challenge in education. On the one hand,

* **Quinnnetukut Habitats: Connecticut's last 12,000 years;** American Indian Archaeological Institute Nature Trail Guide.

the search for a meaningful, unified, educational experience which motivates our young people is being vigorously pursued. At the same time, there is a tremendous untapped, nationwide surge of interest in our human history, our roots here in America, and our American Indian predecessors. Part of this is undoubtedly due to the Bicentennial celebration of our country, but a not insignificant part is the product of our belief that the Indian was a child of nature—that at times during his history he may have been among the greatest ecologists who ever lived. Ironically, in spite of this interest, very little is known of American Indian prehistory, particularly in southern New England and Connecticut.

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The Arcadian Scientist, 1883.
Bulletin of Massachusetts Natural History, 1884.
The Naturalist in Florida, 1884.
Random Notes on Natural History, 1884-85.
The West American Scientist, 1884-1914.
The Agassiz Association Journal, 1885.
The Hoosier Naturalist, 1885-88.
The Museum, 1885.
Problems of Nature, 1885.
The Western Naturalist, 1887-88.
The Ottawa Naturalist, 1887-95.
Geological and Scientific Bulletin, 1888.
The Agassiz Association Bulletin, 1890-91.
Wisconsin Naturalist, 1890-91; 1897-1900.
The Amateur Collector, 1886-89.
The Agassiz Record, 1888.
The Observer, 1890-95.
The American Magazine of Natural Science, 1892-94.
The Aquarium, 1892-95.
The Naturalist, 1894-95.
The Oregon Naturalist, 1894-95.
The Naturalist, 1894.
The Amateur Naturalist, 1894-1908.
The Museum, 1894-1900.
The Naturalist and Collector, 1895.
The Naturalists Journal, 1895.
Natural Science News, 1895-96.
The Natural Science Journal, 1897.
Canadian Natural Science News, 1897.
Ohio Naturalist, 1900-1903.

B. Microscopy

American Journal of Microscopy and Popular Science, 1876-85.
The American Monthly Microscopical Journal, 1880-87.
The Microscope, 1886-89.
The American Monthly Microscopical Journal, 1888-95.
Practical Microscopy, 1890-95.

C. Botany and Forestry

The American Journal of Forestry, 1882-83.
Journal of Mycology, 1885-94.

D. Entomology

The Practical Entomologist, 1865-67.
The North American Entomologist, 1879-80.
Papilio, 1881-84.
Entomologia Americana, 1885-88.
Insect Life, 1889-95.
Entomological News and Proceedings of the Entomological Section of Academy of Natural Sciences of Philadelphia, 1890-95.

E. Conchology

The Conchologists Exchange, 1886-87.
Ornithologist and Oölogist, 1876-93.
Bulletin of the Nuttall Ornithological Club, 1876-83.
The Western Oölogist, 1878.
The Oölogist, 1884-95.
The Young Ornithologist, 1885.
The Audubon Magazine, 1887-89.
The American Osprey, 1890.
Maine Ornithologist and Oölogist, 1890-91.
The Nidiologist, 1893-95.
The Iowa Ornithologist, 1894-97.
The Avifauna, 1895.
The Osprey, 1896.
Birds, 1897-98.
Bulletin of the Michigan Ornithological Club, 1897-99.

F. Ornithology

The Journal of the Maine Ornithological Society, 1899-1911.

G. Geology and Paleontology

The Paleontologist, 1878-82.
The American Geologist, 1888-94.
The Journal of Geology, 1893.
Bulletins of American Paleontology, 1895.

The Gunnery-Wykeham Rise Schools and the American Indian Archaeological Institute believe they have a unique and meaningful solution to both of these challenges through the development of the Precollege Program in Archaeology and the American Indian Nature Trail.

History

The Gunnery and Wykeham Rise are boarding schools for boys and girls respectively, located some three quarters of a mile apart in rural Washington, Connecticut. They began courses and field excavations as early as 1968 in conjunction with the Shepaug Valley Archaeological Society. After several discoveries of national scientific significance, and an awakening of community, faculty and student interest, the Gunnery-Wykeham Rise Precollege Program in Archaeology and the Archaeology Society's American Indian Archaeological Institute were formulated. They offer secondary school teachers and students and interested adults an opportunity to participate together in the discovery of history and to contribute in a significant way to the knowledge of their Connecticut forebearers.

The Precollege Program in Archaeology is offered as a coherent, inter-disciplinary college preparatory program. It develops from core courses in Archaeology, Anthropology, Human Ecology, and 240 hours of required field excavation experience. The Program also includes courses in science, history, math, English and the arts.

In addition to the excellent science and other facilities now present at The Gunnery and Wykeham Rise, the "home" of the Program is The American Indian Archaeological Institute, built in 1974 by The Shepaug Valley Archaeological Society within two miles of The Gunnery-Wykeham campuses. The Institute is an education and research-oriented center for students of all ages interested in American Indian history, with exhibits, archaeology courses and a collection of approximately 500,000 artifacts.

In addition to School and Institute facilities, the Program is blessed with an area rich in Indian history which provides an ideal field laboratory. One hundred-fifty Indian encampments have been mapped within a radius of 8 miles of the two campuses and the Institute. On some sites as many as twelve cultures, layer upon layer, have been recorded, the earliest dating to before 8,000 B.C. Twenty-two carbon dates have been recorded to scientifically verify cultures dating back to 3435 B.C. On one site five cultures have been uncovered, and 1,000 artifacts have been uncovered, and 1,000 artifacts have been retrieved, including a cache of tools and

a hearth which is the oldest so far scientifically dated in Connecticut. On another site, hearths, pottery and dwelling plans of later Indian settlements, a musket ball with tooth marks, a snuff vial and a clay pipe dated about A.D. 1690 have been unearthed.

The Objective

In searching for a highly effective way to disseminate information discovered by the students to a history and ecology conscious public, a unique idea was formulated by School and Institute staff — the concept of an outdoor laboratory, multi-sensory experience: the American Indian Nature Trail. Thus, as the classes and trained volunteers uncovered horizon after horizon of Indian culture, both the history and the natural history of the area could be reproduced for modern man to experience and study. The site chosen for this Trail is on 15 acres of forested land owned by the American Indian Archaeological Institute. The land overlooks the 1200 acre Steep Rock Park in the Shepaug River valley and the first site excavated by student and adult volunteers.

Trail Planning and Planting

During the winter of 1974, a grant was received from the Washington Garden Club to help defray the cost of developing and planting the Trail, and a plan was drawn up under the expert tutelage of the Eliot Pratt Outdoor Education Center. Associated flora and fauna patterns, present since the last glacier, have been largely determined through pollen analysis, habitat studies and plant and animal remains preserved in Indian fire and trash pits. Integrated into these habitats will be dwelling plans, hearths, work areas, burials and other cultural information uncovered by the excavators

to provide an approximation of the life and times of each early American Indian culture.

Two trails have been mapped. A long trail will be developed in the future and will be largely for habitat research. The short trail, a ¼ mile loop has been laid out, not only to take maximum advantage of the natural topography and vegetation, but also to allow for extensive redevelopment of all of the various habitats the Indians knew during their 10,000 years of occupation. Inherent in the plan is the premise that this is not a single walk experience, but has to be repeated at least three times a year, with three separate trail guides, in order to appreciate the extremes of the various seasons.

Construction Begins

Construction of the Trail began in the spring of 1975 with the assistance of volunteers from the Washington Garden Club, Washington Girl Scout Troop and Gunnery-Wykeham Rise students. The Trail was cleared and wooden log steps and wood chips were placed in key locations.

In order to minimize the potential of vandalism and maximize the educational experience, numbered markers are set at various vantage points along the Trail and a take-home folder, available at the beginning of the Trail, develops the unfolding story of Early Man and his environment.

After extensive consultation with scientists, research in school and Institute libraries, and careful analysis of data excavated from local Indian sites, the following habitat sequence is being planted and managed on expanding one acre plots by students, area volunteers and Institute staff as money and time permit.



Habitat No. 1, The Tundra

Upon entering the Trail, visitors begin to climb a small knoll. They are asked to imagine themselves swirling back through time to a period 12,000 years ago when the great sheets of ice had finally begun to retreat northward, leaving Connecticut a vast arctic tundra broken only by clumps of stunted spruce and alder. To accomplish this re-creation, the area will be cleared of all vegetation and topsoil and rocky soils of the characteristic polyhedron shape will be superimposed on the sterile subsoil. Varieties of arctic plants which can withstand Connecticut's warmer climate, such as the blueberry and mat-forming shrubs of the heath family, will be planted, along with white and black spruce and alder whose size will be controlled by careful pruning. Herds of barren ground caribou, musk ox, mammoth and mastodon grazed on such a tundra 12,000 years ago. Living largely on these animals, but surely using the abundant berries in season, was the earliest known man to inhabit Connecticut; and hence the story of the American Indian must begin here in this very hostile environment. This habitat is the most difficult and expensive to recreate, and while the necessary research and some clearing have been done, this part of the Trail is not expected to be completed until funds permit, hopefully by 1977.

Habitat No. 2, The Spruce-Fir Forest

As time passed and the climate warmed, cathedral-like stands of black and white spruce, balsam fir and paper birch shaded out and replaced the vast tundra grazing land. Water-oriented mammals such as the beaver, moose and mink were plentiful in the bog-covered lowlands, while the large grazing mammals became extinct or moved north. Early Man would appear to have largely vanished from the Connecticut scene.

Creation of this time zone has already begun with the clearing and planting of over 500 black and white spruce seedlings on the area of the Trail adjacent to the tundra. Larger spruce and birch have been interspersed with the seedlings to give an immediate impression of this boreal forest area. The proper understory is already growing naturally there — blueberry, bracken fern, wild lily of the valley and other characteristic plants.

Habitat No. 3, The Pine Forest

Man would appear to have returned in significant numbers, along with the grazing mammals some 8,000 years ago, to a white pine-dominated forest with oak, hemlock, birch, alder, hornbeam and bayberry. This forest type was planted in the fall of 1975 as the next habitat



of the Nature Trail. Many of the desired canopy, understory, shrub and ground plant species are already in the area, hence this section needed only selective cutting and planting of white pine. The ground cover is once again quite acceptable.

Habitats Nos. 4, 5 and 6, The Oak-Hemlock, Oak-Hickory and Oak-Chestnut Forests

The last three areas of the Trail represent habitat types still found, both on the Nature Trail itself and over much of southern New England. Hence the changes in the existing forest are minor and essentially involve selective cutting and the planting of key individual species not immediately adjacent to the Trail. The oak-hemlock forest of 7,000 years ago, the oak-hickory of 4,500 years ago and the oak-chestnut of 2,000 years ago are these forest types. Oak, hemlock and hickory are plentiful along the Trail, and chestnut saplings are abundant, although they still die back before maturity because of the recurring chestnut blight. As dwelling plans are discovered and verified by excavation teams, students will attempt to reconstruct them in the appropriate habitat, experimenting with potential natural materials. A rock shelter for the tundra dwellers is contemplated, along with several sizes of wigwams believed to have been used by the Indians in Connecticut in the last 3,000 years. Cultural items such as fire and trash pits, drying and skinning racks, work areas and appropriate artifacts will be incorporated into the dwelling areas when and where appropriate. Once the dwellings are constructed, student volunteers will attempt to live in them, both to act as guides for the visitors, and to do studies of the impact on the botanical and zoological life of the area of a person living such a life

style. In addition, sample plot studies will closely follow floral and climatic changes within each habitat. One fascinating study will be to see whether birds and even small mammals and invertebrates native to the various habitats, such as the spruce and pine forests, might somehow find their way back to the recreated forests. After a suitable time, some of the smaller species will be introduced.

Program and Institute Goals

The Trail will thus become a living laboratory where students of Indian history can first present their discoveries and then test them under field conditions. Exhibits in the Institute which students will help to design, prepare, and test, will serve as an introduction to the field experience. In this way, the students themselves will experience at first hand the sweep of human history and the struggle of man over the centuries to find his place in the natural world. To do this, they will have to draw from all aspects of their educational experience and thus see a relevance and totality which in this era of departmentalized schooling is rarely achieved. This is the goal of the Gunnery-Wykeham Rise Archaeology Program, the American Indian Archaeological Institute and the American Indian Nature Trail.

NOTE: In the Spring Issue, 1975 of *Nature Study*, our Tips referred to this program as being conducted by a high school at Wykeham Rise, Conn. Edmund Swigart asked that we call your attention to the fact that the pre-college program in archaeology is offered by a consortium of The Gunnery and Wykeham Rise Schools (which are secondary schools) in Washington, Connecticut.

NATURE CITY

Translating the Natural Environment into Urban Language

CHARLES A. LEWIS

Horticulturist, The Morton Arboretum, Lisle, Illinois

"Hey, man — are there lions and tigers in there?"

"How about bears?"

". . . or snakes?"

Twelve teen-aged boys looked apprehensively at the forest, not sure whether or not they wanted to enter. It was their first visit to the Arboretum, and the formidable jungle they faced was a peaceable patch of woods on the West Side — hardly cause for such uneasy feelings. But for these boys, residents of a nearby juvenile correctional center, the forest was not part of their common experience. The inner-city landscape with which they had grown up consisted mainly of asphalt, brick, stone, and concrete — with only weeds, grass, and a few trees for vegetation. They knew and had learned to contend with the threats inherent in that environment, but the forest was unfamiliar; its dangers could only be imagined — and feared.

When I joined the boys for their visit on this early June day, I had been thinking about ways to help them perceive something of the elements and systems at work in natural outdoor communities. Because their cultural frame of reference had been formed by the urban environment, I thought it might be effective to point out functional and organizational parallels between natural environments and the city, using familiar urban terms to identify elements of the natural landscape. Perhaps they could understand the natural world better by thinking of it as another kind of functioning "city." Not quite sure whether or not this approach would work, I decided to try it, letting the boys show me the way.

Even as the boys introduced themselves and shook hands with me, they began to teach me, for the handshake was different from any I knew. Instead of grasping the lower part of my hand with their fingers, they grasped the top part of my hand with fingers circling my thumb. I did the same. I later learned that this is the soul-brother handshake, a sign of friendship and solidarity in the black community. I must admit that it transmits a greater sense of personal contact than our more genteel method.

To ease our first meeting and to become better acquainted, I explained that

I had come here recently from the East and asked them to help me become acquainted with their city. What was it like? Was it crowded full of tall buildings, or were there many parks? What were their houses made of? Was there any vegetation where they lived?

Next I began to ask about how things were transported in the city. How did they get water? The first answer was, "Turn on the faucet," but after a little further probing, I learned that water came into the buildings through pipes that were under the streets. Was there anything else under the streets? "Other pipes." "Wires." "Tunnels for automobiles." What happened to water after a rain? "It goes down the sewer." "It goes under the streets." What happened when you flushed the toilet? "It goes down pipes." Where did the pipes go? "Underground." "To the sewage plant." What about garbage? "Goes into garbage cans." Then what happened to it? "Sometimes we knock the cans over." (Laughter) "The garbage man takes it away."

I wanted to know something about the communities in the city, too. Was the city all the same? "There are different neighborhoods." What made them different? "Other kinds of people live in them."

As other questions followed, the boys — in providing for my orientation — focused their attention more and more on the physical aspects of their city. I recapitulated their description of the city — what it looks like and how it works — and thanked them for helping me understand more about where they live. Then I announced that we were going to visit another city: Nature City. After I assured them that we would encounter no bears, tigers, lions, or poisonous snakes in this "city," we set out.

Our first stop was a pond, rich with many forms of life. I asked the boys if they could figure out who lived in this pond neighborhood. They noticed the iris and the cattails around the edge, the many plants growing in the water, and the dragonflies. No one saw a turtle, and it took a concentrated search to locate the two eyes of a dark green frog, peering above the water. As soon as one was discovered, bedlam broke loose! "Can we catch one?" "Can we take him

home?" Yes, they might catch one if they could. Take it home? Well — I wondered aloud how they would like it if someone came into their house, took a look at them, and said, "Hey, you look interesting! I'll take you!" and then grabbed them up and took them away. There was silence; the impact was obvious. I told them that many kinds of creatures lived in Nature City and, like the boys, wouldn't want to be taken away from their homes.

As the boys got the message, a rule was established: all things found in Nature City had to stay in Nature City. We could look at them, perhaps pick some of them up, examine them under a hand lens, but everything had to be replaced and not taken away. This seemed reasonable to the boys and was an effective lesson for the rest of our trip. I made a mental note: the pond neighborhood with its lesson would be the first stop on all future visits to Nature City.

Next we followed a path into the woods, and looked overhead at the lush foliage of oaks and maples. I asked the boys what happened to the leaves on the trees in the fall. "They fall on the ground." Did anyone take them away? "No." Well, if they fell on the ground every year and no one took them away, why weren't they piled up higher than our heads? What had happened to them? Again there was silence. Did they remember what they had said about garbage in their city? Well, then, did Nature City have garbage men? If so, who were they and where would we find them?

This was quite a question. I suggested we begin finding out by examining the layer of leaves on the ground, removing leaves one by one. Soon we discovered some leaves with holes in them. How did the holes get there? "Bugs ate them." "And worms!" We continued removing leaves, and we began to find insects. "Man, look at that bug!" "Kill it, quick!" I stopped the execution. Wait a minute — why should we kill it? Was it hurting us? What was it doing? There was a thoughtful pause. "I guess he is eating the leaves and stuff on the ground." So, who was he in Nature City? "The garbage man!" came the chorused reply.

From that point on, everyone's eyes were focused on the miniature world

found on the forest floor, where we discovered a whole host of nature's garbage men working in leaves, twigs, and rotting logs. We picked up many of them and examined them closely through a hand lens. The magnified world provided an endless source of interest, and by the boys' own initiative it soon became routine procedure to look at everything new through the hand lens. The person given charge of the hand lens was recognized as having a position of status!

At about this time a subtle shift in emphasis took place. I found that I was no longer asking most of the questions, because the boys were exploring everything they could find, asking their own questions, and leading me. In the forest neighborhood they wanted to know why some trees were fat, others thin. A brush with unseen wild onions brought the comment, "I smell something cooking." We stopped to find and taste the plant and to learn, indeed, what was "cooking"! A discovery was made when crossing a stream: in Nature City pipes aren't always necessary for delivering water to various neighborhoods. But how did water get to the tops of trees? Were there pipes in trees?

Along the path we stopped to compare the surface we were walking on with the woodland floor next to it. What were the differences in appearance, and why? "There aren't as many plants on the path." Is it easier to poke a stick into the path or into the woodland soil? "Woodland soil." Why? Thus we learned about compaction and some of its effects. What were those wooden things that looked like steps on the path? We found they were exposed roots, and we guessed why they weren't underground. We dug a little deeper into the woodland soil to find out what is below ground in Nature City. Not pipes, electric lines, or cars — but roots, worm tunnels, and bugs.

At the edge of the woods, we moved out into a more open field where wild geraniums were in bloom. Immediately someone asked, "Where do they come from?" My answer was to ask who had planted them. In chorus, the boys shouted, "Mother Nature!" Where did she get the seeds? No answer. "Did she get them at the store?" came a questioning reply. There was general agreement that she hadn't gotten them at the store. We looked around and spotted some old narcissus that had finished blooming. There were suspicious swellings at the tops of their stems, and we opened these up and examined them with the hand lens to find our answer. What was inside? "Seeds." How had the seeds gotten in there? To find out, we looked at some of the geraniums which had a few remaining blossoms but were also de-

veloping long, thin seed pods. We examined the flowers under the hand lens to see flower parts, and we looked at the developing seed pods to learn how nature's "seed packets" are produced.

I wanted to know who, besides flowers, lived in the field neighborhood. "Grasses," "Weeds," "Bushes," were the boys' answers. Anything else? We began to search and soon found small trails in the high grass. The boys wondered what they were and who had made them. I told them it was probably a meadow mouse. Several boys expressed disappointment at not seeing any wild animals, and I explained that animals were frightened away by all of the noise we made.

Next we visited a lake neighborhood that had been created by damming a stream. How was this like the pond neighborhood we visited earlier, and how was it different? Again, their curiosity pointed the way. "Its bigger." "There aren't as many weeds in the water." "There are fish." And there were frogs, which this time they caught, examined, and returned to the water. The dramatic flow of water over the dam accentuated the fact that the water was moving through this neighborhood and was not still, as it had been in the pond. What would happen if the dam were removed? The boys were surprised to realize that the lake would disappear.

The last neighborhood we visited was a dense, quiet grove of tall spruce trees: an evergreen neighborhood. Again, we wanted to find out who lived there and compare the neighborhood with the oak-maple forest we had seen. "More low branches in the other forest." "More things were growing on the ground." "It wasn't so dark." "This one smells different." I asked the boys what cones were all about. Why did some of them have all their scales gone so they looked like corncobs? What had happened to them? Had something eaten them? "Yes." Who? "Maybe squirrels." "Or birds." We were reminded that Nature City provides food for all the kinds of creatures who live there. Someone asked, "Are all these pine trees?" We talked about the fact that there are many kinds of evergreens, and that not all were pine. These were called spruce.

Now our trip was coming to an end, and as we left the cool spruce grove we talked about all the neighborhoods we had visited in Nature City — who lived in them and what was special about each one. We realized what a great number and variety of residents — plants and animals — lived in Nature City, yet how well they all got along and how each one contributed something important.

When the boys climbed onto their bus for the trip back to the youth center,

they wanted to know if they could come back to Nature City again, and I knew they had enjoyed their visit as much as I had.

• • •

What is the key by which we enter Nature City? It begins with the realization that things familiar to us may be quite unfamiliar to someone else. If we can see natural areas through another person's eyes, in another cultural context, perhaps we can begin to translate what we know into understandable terms. We are, in a very real sense, "interpreters" and we need to understand other "languages" to be effective. For an inner-city youth, natural habitats become more comprehensible when presented as a familiar concept: neighborhoods in a city.

Perhaps the urban youngster who visits Nature City will not have learned the name of even one tree, flower, shrub, or animal, but he may have gained a general idea of the organization of natural systems. Hopefully, he also may have discovered that a place which, to him, was filled with imagined terrors is, instead, a benevolent, lively, varied, and interesting place to visit. Once his interest is aroused and his perception focused on the special minutiae of a natural area, his innate curiosity — like that of youngsters everywhere — takes over, and you find that he is leading you through Nature City, giving *you* the rare privilege of seeing it for the first time through his eyes.

This article has been reprinted with permission from The Morton Arboretum Quarterly, Summer, 1975.

Earth Center Publishes Guide To Street Tree Care

Brooklyn, N.Y. — The Magnolia Tree Earth Center announces the publication of "Tree Tips from the Tree Corps," a pocket-sized guide to caring for street trees. This attractive and handy guide, prepared by Earth Center volunteer Sandy Batty, outlines several steps city residents can take to provide basic maintenance for neighborhood street trees.

Suggestions include tips on litter removal, cultivation and enrichment of soil, and protection from animals, chemicals and pedestrians, as well as information on reporting hurt trees and planting new ones. The recommendations are based on the tree maintenance activities of the Bedford-Stuyvesant Neighborhood Tree Corps, a year-round horticultural program for youngsters 9-15 years of age. Single copies of the guide, supplemented by an annotated bibliography of books on trees, are available free when requests are accompanied by a stamped,

Continued on page 19

A School-Community Inter-City Project

ELOIS DEMARAY

Although San Francisco Bay has a profound affect on the life of all the people who live in the counties surrounding it, many boys and girls in this area have little understanding of the fragile nature of its estuarine ecology or knowledge of the history of man's effect on the Bay.

An occasional trip to the dump is the only direct contact that many of these children have with the tidelands, and for others the Bay is something one needs to pay a toll to cross. Young people need the opportunity to develop a real appreciation for the many facets of living near one of the most beautiful, interesting, but most endangered estuaries in the world. Even though it provides people with food, air to breathe, a comfortable climate, and recreation, there's too little understanding by both old and young of its complex environmental problems.

Physical access to the Bay from the eastern side is very limited. Still boys and girls need to learn that dredging, draining, filling and polluting of the Bay cannot be done with impunity. They must be given a clear understanding of the intricate relationships between man and marsh. In short, our young people need to learn that the quality of life for Bay Area residents depends on the quality of the Bay environment.

Materials need to be developed in connection with the ecologic history of San Francisco Bay which will motivate and assist youngsters with their inquiry into the role of this estuarine area in their personal lives. The concepts of the food-energy cycle, carbon dioxide-oxygen exchange and the processes of suc-

cession, particularly during the last 150 years, need to be included. These basic ecologic concepts must also be related to the culture and government of the peoples who have lived here. Analogies between past and present conditions can provoke inquiry into such things as the effects of urban development, industrialization, and conservation legislation on the Bay.

Objectives

This project will make available to interpretative leaders and teachers interdisciplinary resource materials, a booklet and guide, on San Francisco Bay tidelands and man's use and misuse of them. Problems of maintaining a quality environment will not be solved by the next generation of Bay Area residents unless they are well understood by the boys and girls in school today.

The specific objectives of the guide will include the following:

- To bring to Bay Area boys and girls a greater appreciation for the esthetics of living near San Francisco Bay.
- To probe the estuarine ecosystem to ascertain the contribution it makes to the quality of life for Bay Area people.
- To develop an awareness of what constitutes renewable and non-renewable estuarine resources.
- To create a concern for the rapid depletion of estuarine areas in our nation.
- To create in the student an awareness of the interdisciplinary nature of environmental problems.
- To provoke the student to further study and research.
- To motivate a commitment to work towards the solution of man-made environmental problems.

The specific objectives of the project will include:

- The development of curriculum materials that are interdisciplinary, highly motivational, that can be used by individuals, groups or classes.
- Providing in-service training to interpretive leaders and teachers so as to make the materials effective.

- Identification of present and potential environmental study sites that have ecologic, environmental or historical significance.
- Evaluation of all aspects of the project.

This project will be useful to students and teachers, and interpretive leaders in the nonformal education sector, and other students of environmental problems in the Bay Area or elsewhere, who are concerned with the rapid depletion of the limited estuarine areas in our country.

An immediate result for these children using the materials will be a greater understanding of the environment of the Bay and an awareness of their own relationship to its ecology. A longer-term benefit will come to students who have the use of any environmental studies sites which are developed as a result of the survey. More field trips for pupils will result from the resource materials in the guides as teachers and parents become acquainted with places where children can go to study Bay history and ecology.

Approach

- A search of historical records and literature will be made for descriptions of the bay, its flora and fauna, at various periods during the past 150 years. Certain examples of man's use or misuse of the Bay will be recorded.
- A survey of existing and potential Environmental Study Sites along the East and South shores of South San Francisco Bay will be made and recorded.
- A booklet will be written about some of the episodes in the ecologic history of S. F. Bay. It will be written at a reading level suitable for Intermediate Enrichment and Junior High School students. Action episodes will be emphasized that should be of interest to all levels of readers who are not already familiar with the subject and the events.
- The philosophical pattern which will be used in the Ecologic History and the supplementary materials will be based on *Ekistics*, which is a Cali-

EDITOR'S NOTE: The cities of Newark, Union City, and Fremont make up the tri-cities area served by the Tri-City Ecology Center. These cities are on the east side of South San Francisco Bay about half way between San Jose and Oakland. They are in Alameda County.

Fremont is the largest in land area and has several thousand acres of tidal and marsh lands. These lands include the hauling grounds of the harbor seal.

Mrs. Demaray teaches natural science in American High School in Fremont, Ca. She taught elementary grades twelve years. Previous to teaching, she had experience as a journalist and in 1974-75 she had a weekly ecology broadcast on three local radio stations. Her pupils have helped develop several community ecology projects including development of a park.

fornia State Dept. of Education publication, 1973.

The concepts to be developed will encompass the curriculum areas of Science, Social Sciences, and the Humanities. They will include Cognitive and Affective aspects of learning with such ideas as the following:

- Societies perceive environmental issues of their time on the basis of past experience.
- The interaction of the cultures with available technology determines the nature of the environment, which is planned and developed.
- Social issues and decisions alter the environment.
- Social issues and decisions determine the utilization of all resources (emphasis on political decisions involving government and legislative action). *Ekistics*, Pgs. 22 and 23.

Tri-City Ecology Center was organized in January of 1971 by a group of citizens who were concerned about environmental problems in the East Bay and saw the need for an action oriented group.

Volunteers organized a recycling center for the people of the area and a number of committees were formed to deal with various kinds of problems, such as consumer education, air pollution and environmental legislation.

The *Eco-Logic* is the monthly news bulletin which keeps members informed on local and regional news, legislative and city council actions. Tri-City Ecology Center has played an active role in establishing the South San Francisco Bay Wildlife Refuge, and was a prime force in the establishment of a community nature study center (woods, creek and fresh water marsh) at Central Park in Fremont. The organization has frequently acted in organizing and liaison roles.

One of the several committees is the Education Committee. This group is made up of teachers, K-12, from schools in the area. Mr. Phil Holmes, principal of Mattos School in the Fremont Unified School Dist. is chairman of this committee.

The Education Committee has encouraged environmental education in the schools the past two years by giving \$75,000 cash field trip awards (4 awards each year) to schools or classes with exemplary projects. The committee has a program of distributing books and pamphlets on conservation and ecology to many school libraries.

Members of this committee will do the survey of Environmental Study Sites. They will act as consultants in the re-

search of history and literature and in the preparation of the guide. The Education Committee will develop and evaluate the in-service training of teachers and interpretive leaders in the use of the booklet and guide. They will also pilot the use of the materials in some classes.

The writer will keep a complete record of resources and references; also taped interviews and other A.V. materials used in preparing the materials. A complete Bibliography will be prepared.

An evaluation instrument will be devised by the Education Committee. Pre and post tests on the concepts involved in each section of the booklet will be developed by the Committee and given to pilot classes of students. The In-service training workshops will be evaluated by participants at the end of the session.

Students' photography and art work will be used in the illustrations for the booklet. There are a number of students in the district who are experienced in this area.

"City Critters" Available

Through the generosity of former president Helen Ross Russell, her popular book, "City Critters," has been given to ANSS for reprinting and sale. This revised edition is bound in paperback, with new illustrations throughout. It replaces the first edition, which has been out of print for some time.

Dr. Russell has given the book to the Society not only as a means of furthering nature education but also to provide ANSS with a source of income. The book has been printed by Wilkins Printers of Cortland, N. Y. Orders for the book, either single copies or in quantity, may be addressed to any officer of the Society or sent directly to the printer at the following address: Wilkins Printers, 4000 West Rd., Cortland, N. Y. 13045. Cost of single copies is \$..... . Retail vendors should write for information on discounts for quantity orders.

We urge all members to ask their local bookstores to stock "City Critters" on their shelves.

FOUR RECOLLECTIONS OF IRISH NATURE IN VERSE

RICHARD F. FLECK

SWIRLS OF CROWS

Swirls of crows arise and fly
High in skies of Northern Ireland
Swirling round and squawking loud
Like mythologic harpies.
Chaotic blackness spreads throughout
Like a whirlpool swirling round
Over Derry, east to Antrim
Where once rolled fields
Streaked with peaceful mist.

GHOSTS OF TWILIGHT

Layers of mist spread slowly
Through the valleys tinged with green.
Dew begins to form on drooping foxgloves
And on stalks of rushes and hawthorn bushes
Darkening into phantoms swaying in the night
Tristfully reviving memories of yore.

IRISH DECEMBER

A twisted, mossy hawthorn stretches
And seems to scratch the sky
Lit dimly by a feeble sun,
Its face just barely above a hill of barley,
As shadows of the dark noon hour
Slide slowly past dull green fields
Where pensive farmers stand and stare
And dream of things to come.

IRISH JANUARY

Strands of ivy, green and shiny
Cling to trees, void of leaves
Lining bays, misty and grey
Over fields green with a sheen
Of raindrops and pearls.

You Can Do It!

. . . the program of the Audubon Nature Training Society

MARY LAWTON

... our new urban way of life, like Hercules, threatens to separate us from our source of strength. Through no fault of its own, our new generation is being born and brought up in virtual ignorance of the natural world. I am afraid that in the near future our pleas for the importance of wildlife, natural landscape, and natural principles of land-use may well fall on indifferent if not deaf ears . . . We have to get down to the fundamental problem of keeping . . . the child of earth, in touch with the earth."

— Alfred G. Eiter

You adults who are involved with children, you who are parents, grandparents, youth group leaders, classroom teachers, *can* keep the child, even the urban child, in touch with the earth.

You may respond that you do not know enough about the natural world to help others learn, that you do not know names for all those plants and animals. You may feel that nature cannot be taught in the city, or reply that your school does not have money for equipment or field trips. If these are doubts or questions that come to mind, the Audubon Nature Training Society has some encouragement and answers for you.

The aim of the Audubon Nature Training Society has been and ". . . will always be to discover ways of helping children develop an understanding of the out-of doors, and, in the process, rediscover our own curiosity as adults." The Audubon Nature Training Society program was developed, toward achieving this aim, to be a way of going outdoors with children and doing things while there. It is designed to help anyone who is interested in observing, interpreting and enjoying the natural processes of living things, regardless of background information.

You feel that you are not an expert? You have not taught?

The focus of the Audubon Nature Training Society is on becoming aware of what is happening in an ecosystem, rather than on identifying specific plants and animals. It is a series of experiences, techniques and games to use for discovery out-of-doors. Each session includes a variety of activities which are planned to stimulate observation and inquiry when exploring the environment. In addition, for teachers there are many ideas for integration of subject matter back in the classroom, truly an interdisciplinary approach to learning.

NOTE — Audubon Nature Training Society is a San Francisco Bay Area affiliate of the National Audubon Society. It is a program of eleven years' standing and was evolved in keeping with the second of Audubon's broad purposes: conservation of natural resources and environmental education.

You do not know names for all those plants and animals?

"We have found that naming the discovery usually closes the investigation," writes Joe E. Wright, Environmental consultant. Instead, develop a series of questions that can be posed as "I wonder." I wonder when? I wonder where? I wonder how? I wonder if? Answer a "what's that?" question with a thinking question, one that helps the asker use information he already has, or that can be answered by observation. Within a group there are many points of view that add up to good answers and greater awareness.

There's no nature in the city?

Step to the door. There is natural history at your feet and in the air, all around you. Plants and animals, by sight or sign, are there for living biology lessons; are interacting with non-living factors to produce an ecosystem. Organizing to learn these lessons is what the Audubon Nature Training Society's program is all about.

Your school district has little or no money for equipment or field trips?

Each person, adult and child, has built-in equipment: feet, eyes, ears, nose, fingers that may be extended with simple tools such as a hand lens, not a large financial investment. What is important is "looking" with all the senses and communicating these observations to others. Right outside your doorstep is a rich teaching resource, the schoolyard, the back yard, or a vacant lot. Observations made on a day-to-day basis, in familiar territory, lead to a feeling for the dynamics of change. Through the processes recognized there, ecological concepts can be developed that transfer to a variety of out-door environments as horizons broaden to nearby parks or mountain trails.

It is the first step, from indoors to outdoors, that is important. Take it! You, hand-in-hand with Audubon Nature Training Society's philosophy and practical ideas, can keep the child in touch with the earth. You can stimulate to awareness, sharpen the ability to observe, deepen sensitivity to understand and to develop what Aldo Leopold terms an "ecological conscience" — *caring* for the place where we all live.



Celebrating the Bicentennial with Colonial Household Crafts

It is very hard for anyone living within a mile or two of a shopping center to begin to imagine what life was like two hundred or more years ago when people not only lived close to nature but made practically everything that they used. Some of those things had a charm and beauty that is lacking in our mass-produced culture. Most of them demanded that their makers know something of the natural world and of the properties of plants.

Frequently there was joy and satisfaction to be derived from the making of the object as well as satisfaction to be gained from its use. Modern young people can know a feeling of accomplishment and gain some new appreciations for beauty as well as another kind of knowledge about their ancestors by making some of the common household articles.

Instructions for three early American crafts are given here; a fourth home craft, candle making, was described in the Vinal issue. Each of these are samples that can be developed further or supplemented by other experiences.

WILLIAM R. ROSS is an active participant and demonstrator of crafts at Historic Schaefferstown, Pennsylvania.

CAROL HART has just completed a book on basketry using natural materials.

VIRGINIA SHEER is part of the Manhattan Country School farm staff where she teaches spinning, weaving and natural dyeing to children seven to thirteen years old.

Making A Colonial Broom

WILLIAM R. ROSS

Until the early nineteenth century all brooms were made of wood. Most were made by binding twigs onto a stout stick. Halloween pictures of witches on broomsticks have introduced everyone to this type of broom — a broom that was a common piece of household equipment not only in Salem but in all the American colonies and Europe as well. A few broom makers produced a more durable and flexible product by cutting the end of a stick into thin strips or splints.

When the Alexander Schaeffer Home-

stead and farm in Schaefferstown, Pennsylvania, was set aside as a living museum of the pre-industrial farming techniques and folk crafts of the Pennsylvania Dutch area, Claude Miller, a resident of that historic town, revived the centuries-old art of making wood-splint brooms. He used American hornbeam, *Caprinus Caroliniana*, for these brooms.

American hornbeam is also known as ironwood, blue beech and muscle wood. It is considered a weed tree for foresters since it never attains any girth and is unsuited for lumber. But there were many uses for this tough little tree two hundred years ago. A peeled green trunk of one or two inches in diameter made an excellent spit for cooking meat over a bed of coals. An unpeeled trunk with its muscle-like bark made an excellent crowbar or lever, or a handle for tools . . . or a broom handle.

With patience and sharp tools you, too, can make a wood splint broom. The one described makes an extremely handsome and functional hearth broom, but smaller ones can be made as whisk brooms, and bigger ones — or at least longer handled ones — might be an interesting addition to a bicentennial household exhibit.

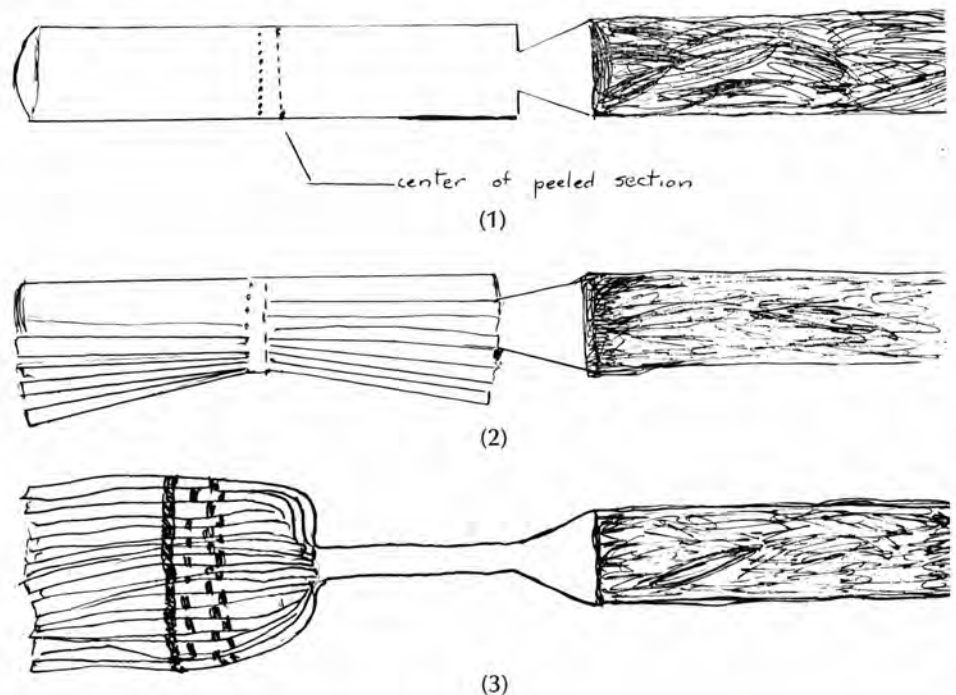
Instructions for Making a Claude Miller Eighteenth Century Broom

Harvest an American hornbeam with a straight trunk that is about an inch and a half to two inches in diameter; cut a four foot long stick.

1. Cut a notch equal to one fourth the diameter all the way around the stick 16 inches from one end. Debark these 16 inches. Mark the center of this section. Add a second line $\frac{1}{2}$ inch below the center.

2. Starting on the bottom peel thin splints up to the point $\frac{1}{2}$ inch below the center. Turn while peeling. Continue until the entire lower section has been cut into narrow splints. Then repeat the process on the outside of the upper section — cutting downward to the center line. Turn while working. Peel so that a handle equal to approximately half the original diameter remains in the center.

3. Fold the splints from the top section over the lower section. Using a long strip of dark inner bark weave in and out between broom splints. Finish by binding with a twisted piece of inner bark. Using a hatchet and a chopping block trim ends so the bottom is flat.





Colonial Broom

Honeysuckle Basketry

CAROL HART

Decorative and useful honeysuckle baskets are fun to make. These baskets can be made in traditional European wicker or willow techniques or in American Indian wicker and twined techniques. Honeysuckle vine is round like willow rods, but much smaller in diameter. It is not unlike hazel or split willow in size, both of which were used by Indians in their basketwork. The Cherokee Indians of North Carolina use honeysuckle along with oak splints to make contemporary baskets. You will definitely feel a kinship to traditional basketmakers, past and present, when you gather and prepare your own materials and use them to make a simple basket.

Plants in the honeysuckle family (Caprifoliaceae) are mostly shrubs or vines with opposite-growing, commonly toothless, simple leaves and clustered, small or funnel shaped flowers. Of the many honeysuckles growing in this country, Japanese honeysuckle (*Lonicera japonica*) is the most commonly used for basketry. Its ground runners are long, sometimes reaching 15 to 20 feet the first season. The second season growth is usually less. Thereafter the vine starts to branch and is not as desirable for weaving. The runners are also flexible yet tough. The combination of length, flexibility, and toughness makes these vines an ideal material for basketry.

Japanese honeysuckle is a native of Eastern Asia and at least one variety was brought to the United States before 1860. It makes a good tight ground cover and boasts lovely, fragrant flowers, yet has proved to be one of our most vigorous and difficult naturalized plants. It can grow in any soil, under sunny or shady conditions, and so spread rapidly from gardens to surrounding areas throughout the eastern United States. It is found from Florida and Texas to northern New York and northern New England. In Maryland, southern Pennsylvania, and Virginia it has run rampant, often reaching 20 to 30 feet high as it climbs over bushes and trees.

Where and When to Look for Honeysuckle Vines

Japanese honeysuckle is considered a liability because it overwhelms and strangles native flora. It should never be cultivated without the most rigid and continuous control. It is so plentiful that you should be able to find some nearby. Look along roadsides, borders of woods, fencerows, and in orchards. The best vines for weaving are found in mats covering the ground. Gather the first and second year growths between September and April. The first season's growth will not be tough enough to use until the winter.

Identifying Characteristics of Japanese Honeysuckle

1. *Leaves*: persistent or half-evergreen, simple, opposite, without marginal teeth, oval to oblong, pointed, 1-3 inches long, and usually downy beneath.

2. *Bark*: first year — green to purplish white at the tip while growing, changing to light brown and becoming shiny and smooth during first winter; growing darker brown to gray and less shiny the second year.

3. *Flowers*: in pairs, white at first, fading to yellow, mostly purple-tinged, very fragrant, 1-1½ inches long, May to August.

4. *Fruit*: small, black, September to November.

5. *Varieties*: (*aureo-reticulata*) smaller leaves veined with yellow; (*chinensis*) flowers nearly 2 inches long and reddish; (*halliana*) or Hall's Honeysuckle, flowers without the purplish tinge.

Vines to Avoid

Climbing honeysuckle is usually twisted and tangled making it unsuitable for weaving. Vines several years old are likely to have developed large knots. Dead vines break easily. Scratch the bark of a vine. If the inner bark is green then it is living. All honeysuckle has a hole in the center. Vines with holes exceeding ½ the diameter of the vine are likely to split or flatten when used.

Here are steps for preparing honeysuckle for use:

1. Break the vines off near the roots and lay them in straight bundles. When you are finished, coil them for convenient carrying.

2. Break off leaves and any small branches.

3. Coil and place in a deep pan. Cover with water and boil for 3 to 4 hours until the bark loosens. Remove from the pan.

4. Pull each vine through an old cloth or towel. The bark should slip off easily.

Terms

The following terms will be helpful in understanding the step-by-step directions that occur in the following project:

Spokes. The underlying framework or warp of the basket. Spokes are usually larger in size than the weavers.

Weavers. The strands woven over and under the spokes. The weft of the basket.

Base. The foot or bottom of the basket upon which the basket sits.

Turn of the Basket. The point at which the spokes are bent to form the sides of the basket.

Border. The finished rim of the basket formed by a weaving of the spokes through one another.

Materials you will need to make your honeysuckle basket.

8 spokes cut 12" long

15 (approx.) weavers

Soaking pan. Soak honeysuckle 10 minutes before using.

Towel. Wrap weavers in damp towel and use as you need them.

Strong scissors.

Here are step-by-step directions for making a honeysuckle basket:

STEP 1. Cross the 8 spokes as shown.

STEP 2. Begin the weaver under the left set of spokes and wrap around as shown 4 times.

STEP 3. As you begin the 5th round, weave over 2 under 1, over 2 under 1, pulling the corner spokes together as you weave. Continue in this manner. Each round you will be weaving over a different set of 2.

STEP 4. Add a new weaver by ending the tail of the old and adding the point of the new along adjacent spokes as shown.

STEP 5. When the diameter of the base reaches 3", turn the basket by bend-

ing the spokes into an upright position. Keep them in this position by pressing them away from you as you weave. If you continue pressing on the spokes as you weave, your basket shape will converge. If you pull out slightly on the spokes as you weave, the shape will flair out. Be careful not to make the shape flair too much or the spokes will be too far apart and you will have a weak basket.

STEP 6. Begin the border of the basket by taking any spoke and bending it behind the spoke to the right and forward again. Repeat each spoke, working left to right.

STEP 7. Tuck the last spoke through the first as shown.

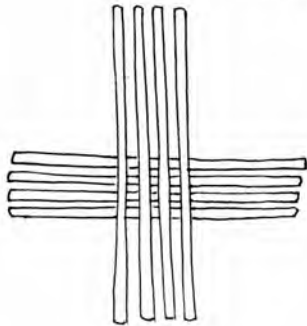
STEP 8. Take any spoke, count 3 spokes to the right, pull them toward the left, and push the spoke through the opening (just to the right of the third spoke). Repeat with each spoke, left to right around the basket. The last 3 spokes may seem difficult to place. They should fit into openings 3 places ahead of each, just as the other spokes did. If the finished border looks neat and consistent, you have done it properly.

STEP 9. Trim the spokes on the inside so they are leaning against an upright spoke. How did you do?

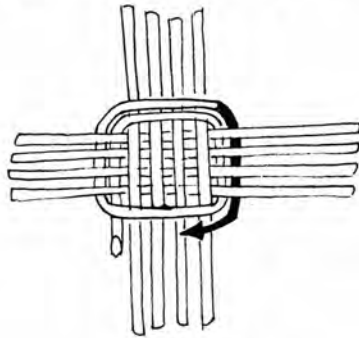
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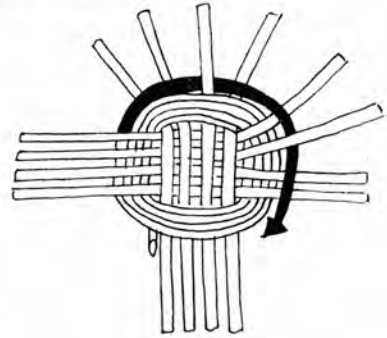
Step By Step Directions For Making A Honeysuckle Basket



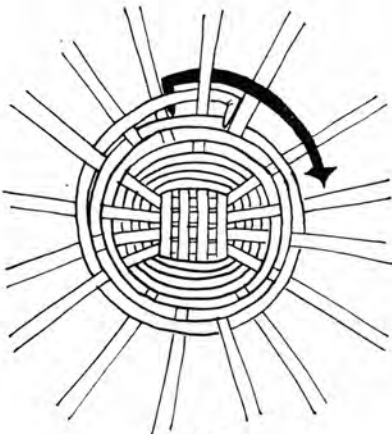
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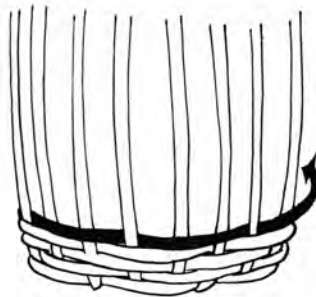
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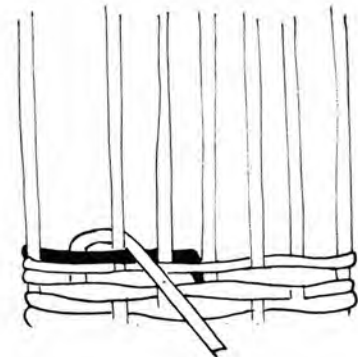
STEP 3



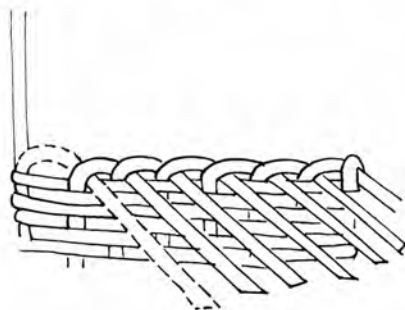
STEP 4



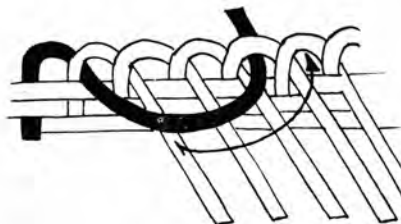
STEP 5



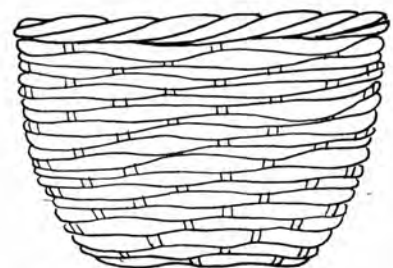
STEP 6



STEP 7



STEP 8



STEP 9



Wicker honeysuckle basket, 5" diameter at border, 5" high.



Open-twined honeysuckle basket, 3 1/2" diameter, 4" high.

Natural Dyeing: An Early American Craft in the Classroom

VIRGINIA SCHEER

Coloring wool with weeds, kitchen wastes, nut hulls, garden flowers or herbs can be an exciting project for students in your class. In natural dyeing woolen yarn is boiled in an extract made from plants the students can gather easily. It is a simple and enjoyable process that entrances children with an array of earthy colors they can produce themselves. As a



classroom activity it can be spread over a long period of time, or it can be done in a day. The dye process has the students use many math skills, and can contribute to a science or a social studies curriculum. Vegetable dyeing was practiced in many early American households, as well as in dye "factories," so it can be done on a household scale. Equipment you can find at home, a few ingredients you can order, dye recipes, three of which are included here, and sources of water and heat are all you will need.

Dyeing uses large quantities of water, and requires long simmering, so it is best to set up near a sink and a hot plate or stove. Without a sink, several clean buckets will be necessary. You will need room to wash and rinse the wool, measure and mix the mordant, and prepare and boil the dyestuff simultaneously, if you plan to complete the dyeing process in one day. Ingredients to gather are the dyestuff (flowers, nut hulls, etc.), mordants, and the wool. Unless you have obtained some raw wool for spinning you should order a small quantity of natural spun wool from one of the sources listed at the end of this article. Bleached white or dyed knitting worsted can give unpredictable results because of unknown chemical additives, and therefore is not recommended. Cotton can be dyed with natural dyes, but with a different procedure than for wool (see Androsko, *Natural Dyes and Home Dyeing*, cited below). Powdered mordants have long been used to set natural dyes and, in most cases, to vary the color obtainable from a single plant. These chemicals, with exotic names such as copperas, chrome, and blue vitriol, were once household items, but are no longer. One exception is cream of tartar which will be used here to aid the mordant "alum" — potassium alum, not the alum used for pickling. Potassium alum can be ordered in small quantities (see below).

Natural dyeing requires simple equipment which you can probably supply from the school or from your home:

One or two non-reacting pots: Glass, enamel, or stainless steel are good. Copper, tin, iron, or aluminum pots will affect the dye. Be sure the pots will hold enough water to cover the wool by several inches. That may be as many as four gallons to one pound of wool.

Three of four rinse bowls: Plastic dishpans or aluminum pots are fine.

Liquid detergent and washing soda (sal soda)

Stirring sticks or spoons: Plastic, glass, or stainless steel

Postal scale for weighing wool and mordants

Collander and cheesecloth

Rubber gloves (optional)

Mordants, especially chrome, can be very poisonous. They should be stored out of reach of children, and all containers of dye and mordants should be washed thoroughly after use. Persons handling mordants should wash their hands afterward.

Most plants for natural dyeing should be gathered in late summer or early fall, though some can be collected in any season, with different results from each season. A wildflower guide is quite valuable to the natural dyer; it not only describes the plant, but also tells where to find it and in what season. Goldenrod, a roadside weed common in August, produces an attractive yellow.* A peck of flowers will dye a pound of wool, enough for a sweater. For a first experiment in dyeing you may want to use one-quarter or one-half of these recipes. To extract the dye, boil the flowers for 15 minutes in water sufficient to cover them. Yellow onion skins can yield colors from yellow to rusty orange, depending on the strength of the dye. For orange, use 10 ounces of onion skins for one pound of wool and prepare as you would goldenrod. Nut hulls, gathered in the fall, make warm browns. A peck of green hulls, soaked and boiled, will dye a pound of wool. Butternut hulls and black walnut hulls should be soaked a half-hour and boiled a half-hour. Hickory nut hulls must soak overnight and boil about an hour. Many other plants, leaves, barks, etc. are good for dyeing. The rule of thumb is to use about a peck (eight dry quarts) for each pound of wool. Experiment with ordinary plants, both wild and from your garden: marigolds, lily of the valley leaves, fennel pants, sumac berries, pearly everlasting, and even black tea, make interesting natural dyes. As long as you are a beginner, do not try exotic dyes for blue and red. And avoid rare or protected plants, many of which contain dye.

Natural dyeing can be done in a day, or the process can be "stretched" by stopping it at several points, and resuming the next day. Instructions for this longer method are in parentheses and are marked with an asterisk (*). First, weigh the dry wool, wind it in a circle skein around chair legs or someone's hands, and make a few loose ties to preserve the circle. Wash the wool in detergent and about one half cup sal soda using water as hot as hands, or hand in rubber gloves, can stand. Three rinses, hot, warm, and cool, are necessary to avoid sudden changes in the temperature of the wool. Such changes can cause the wool to become brittle. In handling the wool it is important not to twist it, for it will stretch. Lift the yarn from the wash or rinse water by one of the ties and *squeeze* the water or suds through the yarn. (*Hang the wool to dry. Wet it in cool water before mordanting the next day.) Measure the mordant: four ounces of alum and one ounce of cream of tartar for each pound of wool to be dyed. Dissolve the mordant in water enough to cover the wool a few inches. Use a non-reacting pot. Bring the wool to a boil in the mordant, then simmer for one hour. (*Allow the wool to cool in the mordant; use only the cool rinse before going on to the next step, dyeing.) As before, rinse in hot, warm, then cool water. While the wool is simmering in the mordant it should be "opened out" or turned gently to allow even penetration of the mordant. If, in mordanting or dyeing, the

level of the water is reduced by evaporation, add more water.

While washing and mordanting are going on, other students can prepare the dye. They will need to crush the flowers and stems or break up the hulls and soak them. Be sure they measure the dyestuff before boiling in a non-reacting pot. After it has boiled the proper amount of time (see recipes above), strain out the plant material. If you wish you may save the dyestuff by lining the collander with cheesecloth and making a tight bag around the dyestuff. You can add it to the final dye; it is said it will make the dye stronger. (*Store the wet, mordanted wool in a plastic bag and bottle the strained dyebath.) Add water to the dyebath sufficient to cover the wool a few inches. Bring the wool to a boil in the dyebath and simmer gently 20 or 30 minutes or until the desired shade has been reached. While it is simmering, open out the yarn several times. Transfer to the hot rinse, then warm and cool rinses. Hang the skein by one of its ties to dry. To speed drying, change its position occasionally. Do not throw away the dyebath; it will probably dye a lot of wool in successively lighter shades.

There are many uses of yarn which emphasize its naturally dyed color: simple weaving, knitting, or crocheting in stripes of different shades. Or strands may be braided for a variety of classroom uses and as student keepsakes. If the yarn is to be used with yarn or fabric of lighter color, before using them together, wash the naturally dyed yarn in detergent to make sure it will not run. If you plan to do more vegetable dyeing, do not forget to keep a labelled sample from each batch.

Your naturally dyed wool will be a unique color or shade that cannot be purchased. Vegetable dyes are particularly valuable for yarn users who desire many graduated shades of one hue; commercial dyers do not bother with so many intermediate shades. For young students natural dyes are an important way they can control an entire process—there is no magic from a can! But the dyeing experiment need not be an isolated activity. Your students' active involvement in dyeing can be related to a number of areas of study. Weighing, measuring, and using fractions contribute to science and math skills, while participating in a hand process, especially if the students learn to spin and weave, can add a new dimension to their study of early American life, or of life in other pre-industrial cultures. The students might embark on an oral history project interviewing older people with rural backgrounds who might remember the hand production of textiles in their families. Natural dyeing might be part of a study of what is natural and what is synthetic, focusing first on dyes and fibers. Older students might investigate the chemical reactions in dyeing and compare the results of natural and modern chemical dyeing. In social studies they might explore the relationship between the roles of colonial family members and the hand production of textiles, or they might trace the mechanization of spinning, dyeing and weaving. Whatever direction it leads your students, the result of an experiment in natural dyeing will be uniquely their own.

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- Brooklyn Botanic Gardens, *Dye Plants and Dyeing—A Handbook*, Brooklyn: Brooklyn Botanic Gardens, 1973
- Merrimack Valley Textile Museum, North Andover, Mass., *Wool Technology and the Industrial Revolution*, handbook to an exhibition, 1965

SOURCES OF MATERIALS

- Earth Guild, 149 Putnam Avenue, Cambridge, Mass. 02139. Yarn, mordants, books, spinning and weaving supplies
- Black Sheep Weaving and Craft Supply, 315 S.W. 3rd Street, Corvallis, Oregon 97330. Yarn, mordants, books, spinning and weaving supplies, natural dyeing kit
- Bartlett Yarns, Inc., Harmony, Maine 04943. Yarn, custom spinning

* This yellow may not be lightfast. To fix goldenrod dye: after dyeing remove the wool from the dye pot and, without rinsing, transfer it to a boiling bath of vinegar and chrome (another mordant). Use 1/6 ounce of chrome (potassium dichromate) and 6 or 7 tablespoons of vinegar for one pound of wool. The wool will be dyed a light or medium brown.

GOOD READING for Environmental Education and Interpretation

The Pleasure of Birds: An Audubon Treasury. Edited by Les Line. Ill. with 28 monochrome drawings by Chuck Ripper and 18 full-page color photographs. J. B. Lippincott, Philadelphia and New York, in cooperation with the National Audubon Society, 1975. 240 pp. \$14.95.

This is an attractive book. The page size is large, 8½ by 11 inches; but this does not make the volume clumsy to handle since it is not overly thick. The contents comprise 25 articles about birds that are outstanding among those published recently in *Audubon* magazine. They have been selected and edited by Les Line, Editor of *Audubon* since 1966, who is also a distinguished bird photographer. The color photographs, representing the work of 14 photographers, are inserted into the text as two "Portfolios" of "Audubon's Photographers."

The publishers, Lippincott, have joined *Audubon* in a publishing venture that will please readers who enjoy the present character of *Audubon*. It is a real service to such readers to have outstanding articles about a single one of the magazine's subjects (in this case, birds) published together in an attractive, hard-bound volume.

Birds furnish, to those who love them, at least two kinds of pleasure. The chief of these is, of course, the pleasure of direct contact with wild birds in nature. But a second pleasure is not to be looked down upon: that of reading about birds. This comes in well during times when, for one reason or another, one is unable to visit the birds in the out-of-doors. From such reading one can pick up a great deal of information that will later enhance his enjoyment of birds in the field.

There is no lack of different styles and viewpoints among the 25 essays that comprise this book. Some of the articles will be enjoyed for the information they communicate; others for the emotions—even laughter—they evoke. To take a few random examples:

Brooks Atkinson writes about the form of addiction that he calls "The Bird Habit." George Plimpton describes in detail, and with a lively sense of humor, his participation in the National Audubon Society's annual Christmas Bird Count. Edwin Way Teale tells of the birds that share with him his old farm. John K. Terres brings into consideration another class of animals, in his account of insect parasites that infest birds. Hal Borland pleads for a "Free Margin for Birds," leaving room for the yet un-

answered questions about birds, for the sake of the myths they give rise to. Edward Ricciuti takes us in our imaginations to Puerto Rico in quest of a nearly extinct parrot species, and we go to the "Haunted Sands of Laysan" with George Laycock to encounter the great damage men have done to the birds there.

The book ends in a most useful appendix on "The Authors," consisting of concise biographical paragraphs about each of them.

* * *

Frogs and Toads of the World by Hilda Simon. Ill. with drawings in 4 colors by the author. J. B. Lippincott, Philadelphia and New York, 1975. 128 pp. \$6.95.

Readers familiar with Ms. Simon's book on *The Private Lives of Orchids* (reviewed in the Summer, 1975 issue of this journal) will expect good things of the present book. And they will not be disappointed; for this is a beautiful little book, written in a style of noteworthy clarity, and with abundant, colorful illustrations.

The subject of the book is not the entire class of amphibians, but one of its three orders, the Salientia, comprising the toads, the tree frogs, and the true frogs. Lack of space justifies this limitation. The salamanders, for example, call for a volume of their own.

Naturalists, both professional and amateur, have not done justice to these animals. They are rather drab creatures, in this part of the world, but on other continents many species are brilliantly colored. Compared with the birds, the species of amphibians are few; and they lack the more complex social organization of some insects. (An exception to this would be the unusual breeding habits of a minority of the amphibians.) Spring peepers share their musicianship with the birds, announcing to winter-weary people the advent of spring, but they were serving this function long before the birds took it over. The "song" of the bullfrogs is much less pleasing to the human ear. Some persons have complained of the bullfrog's nocturnal noise keeping them awake; but then, I have heard at least one person complain about being kept awake by nightingales!

In their larval stage, amphibians breathe by the direct absorption of oxygen through their skin, as well as by means of gills. This implies limitations on their activity. They can breathe through their skin only when it is wet;

hence they can't live in dry places. And their water requirements for breeding are even more stringent. This prevents them from living in dry regions, like deserts or places where water persists in the form of ice throughout the year. They are unable also to adapt to sea water; consequently, there are no marine species of this class.

I must resist the temptation to transcribe all the major facts and ideas of this book. Besides an Index, there is a brief Bibliography and an Index of the Scientific Names of the species illustrated. Curiously, there are no captions on a number of the full-page illustrations—I wonder why they were omitted. These captions can be located, however, in the List of Illustrations of the book, so the deficiency is not a serious one.

I anticipate that many readers will find this book useful and enjoyable.

* * *

Exploring a Brook: Life in the Running Water by Winifred and Cecil Lubell. Ill. with two-color drawings by Winifred Lubell. Parents' Magazine Press, New York. 1975. 64 pp. \$4.59. Grades 2-5.

This is one of the publisher's "Finding-Out Books for science and social studies." The co-authors of this book are well-known from the many books of theirs published by the Parents' Magazine Press.

The book is sturdily bound in the publisher's "Longlife Library" binding. It is generously illustrated with 4 full-page illustrations plus more detailed drawings on the margins of every page of the text. These drawings are relevant to the content of the text, as well as being attractive to the eye. Besides the drawings, there are aids to the young reader in a chapter on how to use a magnifying glass, and another on collecting. There is also an adequate Index.

Perhaps it is because our evolutionary ancestors came out of the seas, that brooks are so fascinating to observe and study. The authors do full justice to the attraction of freshwater streams. The denizens of such waters are illustrated, and their ways of living are described. Frogs, salamanders, mayflies, stoneflies, blackflies and dragonflies, among others, are dealt with, as well as some of the characteristic plants, like algae and mosses.

This little book will supply the young reader with a key to the biology of brooks, and lead him toward direct, outdoor experiences.

Lands Adrift: The Story of Continental Drift by Malcolm E. Weiss. Ill. with two-color drawings by Albert Michini. Parents' Magazine Press, New York. 1975. 64 pp. \$4.59. Grades 2-5.

This is another Finding-Out Book. Its format is similar to that of the immediately preceding book.

One might wonder to what extent children in the lower elementary-school grades are capable of understanding the theory of Continental Drift. A careful examination of the book under consideration is enough to allay one's misgivings.

The book is divided into six chapters. The first chapter tells about Benjamin Franklin's realization that the earth's crust is not as solid as it usually appears to be. This idea was forced upon Franklin's attention by the devastating earthquake that destroyed Lisbon during his lifetime. That catastrophe showed the earth's surface to be more fluid than had been realized.

The next four chapters describe the further types of evidence that support the continental drift theory. These evidences are described as "Clues." The sixth chapter gives a concise summing-up of the theory. The "Clues" add up to the idea that there was once a single continent, which under stresses from the deeper layers of the earth's crust broke up into the continents as we know them today. This would account for the way in which, for example, the east coast of South America "fits into" the western coast of Africa (the Clue of the Jig-Saw Puzzle).

The emphasis of the final paragraph of the book speaks well for the author's concern with the nature of the scientific endeavor:

"For science is not a list of answers. It is like a garden where ideas grow and change with time — as does the changing earth itself."

• • •

Collecting for the City Naturalist by Lois J. Hussey and Catherine Pessino. Ill. with monochrome drawings by Barbara Neill. Thomas Y. Crowell Company, New York, 1975. 80 pp. \$5.95.

This is a third book in a series by these authors. The titles of the two companion volumes are *Collecting Cocoons* and *Collecting Small Fossils*.

The present book is concerned with cities as fields for natural history observations and collecting. It gives lucid directions for collecting and preserving minerals, plants, and animals found in urban habitats. It stresses the importance of keeping usable notes and de-

scribes the kinds of data to be collected. The chapters deal, respectively, with rocks and minerals, trees, birds, insects, and pond life. The implied theme is that one does not have to go beyond the limits of a city for the direct study of natural history. A good place to begin observing and collecting is, so to speak, where you happen to be.

The collecting of specimens is not an end in itself, but is an excellent starting point. Practitioners of the more "exact" sciences have been known to compare naturalists derisively with stamp collectors. But what they imply is erroneous; the fact is that in natural history one has to start out by becoming familiar with the *kinds* of rocks and animals and plants, and with their *names*. More abstract studies come later.

The drawings and language of this book are simple, clear, and direct. In many places, the use of questions that the beginner can answer for himself, instead of ready-made answers, is to be applauded. The emphasis is on what the young reader must do for himself; the book is not an intellectual TV dinner!

There is a well-selected Bibliography and an Index. In addition the names and addresses of several Scientific Supply Houses are listed. The brief biographies of the two Authors and the Illustrator, at the end of the book instead of on the jacket, are in my opinion a good feature.

This book will serve well, especially with the aid of good teachers, in introducing young minds to the joys and fascination of nature study.

STREET TREE CARE

Continued from page 9

self-addressed envelope.

Since 1971 the Neighborhood Tree Corps has provided much-needed care for Bedford-Stuyvesant street trees while giving local youngsters a valuable learning experience. Tree Corps members receive horticultural training in after-school and Saturday classes which are supplemented by field trips and practical experience. Expanded summer classes include more children and special community beautification projects.

The Tree Corps is a program of the Magnolia Tree Earth Center, a non-profit, tax-exempt organization working to create an environmental education center in the brownstones adjacent to Brooklyn's landmark Magnolia grandiflora.

Treks and Trails From 33 States Outlined

For people who like to "get away from it all," Bill Thomas has written two new books that provide excellent ideas for wilderness trips, many that are readily accessible from the nation's major metropolitan centers. *Eastern Trips and Trails* lists 71 different locations in 16 states from Maine to Florida, and *Mid-American Trips and Trails* names 55 sites in 17 states from Alabama to North Dakota and back down to Oklahoma.

There are ideas for every outdoors fan, whether canoeist, hiker, backpacker, fisherman, rock hound, birdwatcher, or a family on a Sunday outing. Locales vary from mountain ridges to virgin forests, rolling sand dunes, primitive swamps, and fertile plains.

Each suggested trip is accompanied by detailed instructions on reaching the location, best roads to see the major at- and *Mid-American Trips and Trails* will give you close-to-home ideas. Both books are in paperback.

Ecology Shop Starts Operation

THE ECOLOGY SHOP, 1520 Gridley Lane, Silver Spring, Maryland 20902, is now operating as a mail order supplier of environmental testing kits, learning games and simulations, energy devices, safety apparatus and books. Mr. Gerald Schneider, an environmental education consultant and President of The Ecology Shop, announced that the Shop will specialize in items that have genuine nature and environmental learning value. There will be no plastic bird houses, cheap nature crafts or the like.

Tired of seeing those with nature and environmental interests exploited by merchandisers of pretty picture books that teach little, Schneider says: "The Ecology Shop will only sell things to parents, children and educators that combine *fun* and *learning* and have application to environmental teaching and safety. It's what I call 'over-the-counter' environmental education."

Mr. Schneider is currently a Ph.D. candidate in Environmental Affairs at the Union Graduate School, Union For Experimenting Colleges And Universities. He holds a B.S. in Wildlife Conservation from Cornell University and an M.A. in Special Studies from The George Washington University. His articles have appeared in many magazines and he is a regular participant at national environmental meetings.

National Awards in E.E.

A national awards program for outstanding work in environmental education is now being sponsored by National Association of Conservation Districts in cooperation with Allis Chalmers Corporation. The first award winners were announced on February 4, 1975 at the annual meeting of NACD in Denver, Colo.

Michael McMillan, social science teacher from Hotchkiss, Colo., won a \$1500 cash award and the title of "Conservation Teacher of the Year." Greenville County Soil and Water Conservation District, Greenville, S. C., under the leadership of Chairman W. B. Bennett, Jr., took first place in the District competition, and also received a \$1500 award.

The nation-wide NACD-Allis Chalmers Education Awards Program in Environmental Conservation was instituted to give recognition to teachers in grades K-12, and to Soil Conservation Districts, for significant contributions to environmental education. The Awards Program is also designed to emphasize the need for multidisciplinary education programs that give young people an understanding of environmental problems and issues.

McMillan's award-winning program is student-centered to provide opportunities for both research and action projects. The focus is on a realistic understanding of local needs in the protection and management of natural resources in the rapidly developing area of Delta County.

Greenville SWCD has for several years played a major role in helping establish outdoor classrooms for schools in Greenville County, and more recently in working with the county school district to hire an environmental education consultant. In addition, Greenville SWCD helped develop plans for a \$1.2 million Environmental Science Center in the county that will provide conservation and environmental learning opportunities for thousands of students.

The Awards Program is open to all teachers who are regularly employed in public, private, or parochial schools. Entries for the 1975 Awards Program must be submitted through local Conservation Districts. State winners were forwarded to NACD Regional office before April 1, 1975. National winners are then selected from the top entries submitted by the seven Regions. For further information on the Awards Program, those interested may write to the NACD office, 1025 Vermont Ave., NW, Washington, D.C. 20005.

Regional winners included:

Teachers: Mrs. Irene McIver, Greensboro, N.C.; James Christensen, Pendle-

Glimmer of Hope For World's Walrus Population

The world's populations of walrus, while close to extinction in some areas, are showing signs of a comeback, Lynn A. Greenwalt, Director of Interior's Fish and Wildlife Service, recently announced.

The range of the two forms of walrus — the Atlantic and the Pacific — encircles the polar basin, but there are far more Pacific walrus than Atlantic. The differences between the two are the longer tusks and larger body of the Pacific walrus.

An annual report summarizing developments concerning marine mammals has been published in the *Federal Register* as required by the Marine Mammals Protection Act of 1972. The report describes the worldwide status of the Atlantic and Pacific walrus.

In the Pacific, where walrus numbers were 40,000 to 50,000 as recently as the early 1950's, it is estimated there are now about 140,000, and biologists believe these numbers are increasing. They warn, however, that this will not continue if the annual Siberian and Alaskan native kill of 5,000-6,000 a year in Alaska and the Soviet Union is increased. The entire Pacific walrus population winters in the pack ice of the Bering Sea, with spring migration north through the Bering Strait as the ice breaks up.

In the Atlantic, the latest figures estimate the walrus population to be on the order of 25,000 in two groups — from the Kara Sea to eastern Greenland and from western Greenland to eastern Canada. They, too, migrate north-south with the edge of the ice cap. The average annual Eskimo and native kill of Atlantic walrus is now about 2,700, and the reproductive rate is estimated to be just a little more than that, at around 3,000 to 5,000 a year. Any increase in kills would seriously jeopardize this sub-species. Herds in the Barents, Kara, and White Seas are close to extinction now.

ton, Ore.; Magdaline A. Davis, Indianapolis, Ind.; Linda Tontz, Guthrie, Okla.; George Weisel, Coopersburg, Penna.; Clarice Wittig, Stickney, S. C.

District: Kalamazoo County SCD, Kalamazoo, Mich.; Cash County SCD, Logan, Utah; Choteau County CD, Fort Benton, Mont.; Contra Costa RCD, Concord, Calif.; Dauphin County CD, Elizabethtown, Penna.; Lubbock County SWCD, Lubbock, Texas.

Since 1956 the U.S.S.R. has prohibited all hunting of Atlantic and Pacific walrus except that necessary for Eskimo survival. Atlantic walrus hunting is limited by Denmark to Greenland residents using craft under 40 tons; hunting areas and dates are regulated. Canada restricts hunting to Eskimos and a few white residents.

Trophy hunting of the Pacific walrus in Alaska was stopped by the Marine Mammals Protection Act of 1972. The Secretary of the Interior has denied all requested trophy hunting permits which were available to whites under the economic hardship clause of the Act. Eskimos and Aleuts are permitted to hunt the Pacific walrus in Alaskan waters under the Act.

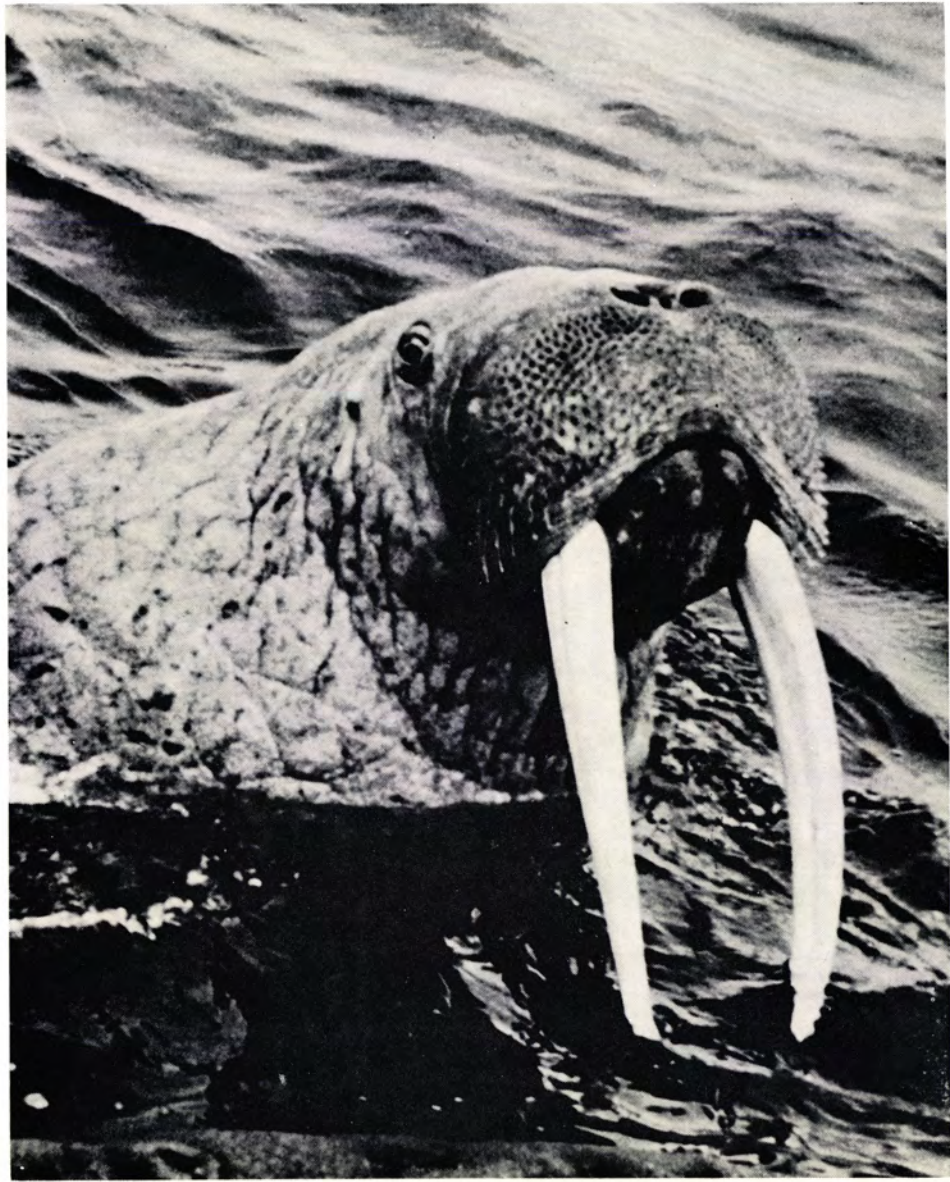
The walrus is a marine mammal known as pinnipeds — pinna meaning wing or fin and pedis meaning foot. Their generic name, *Odobenus*, means "toothwalker." Their long tusks are used for fighting, for climbing on land and ice, and for emergencies like rescuing a pup from an ice crevice. Tusks are not used for eating. At birth a walrus weighs from 85 to 140 pounds and by two years, 750. Old male Pacific walruses have attained 4,000 pounds and females, 2,000.

Walruses feed mainly on clams but also eat snails, crabs, worms, and occasionally an adult male will eat seal flesh. They have a greater specific gravity than water and must rest on ice or land frequently, although pouches may be inflated to enable them to sleep while floating upright at sea.

Calves are dependent on their mothers for at least 18 months and occasionally for as long as two and a half years. Most females do not begin to breed until six or seven years of age. Mating occurs during February and March. Growth of the fetus, which is delayed, does not begin until about June, and the actual growth period is about 10 months. Most cows do not breed again until the year following the birth of their last calf.

The Atlantic and Pacific walruses' eating habits could pose ecological problems for the mammals if offshore drilling for oil in the Bering Sea or Arctic Ocean is undertaken, or if the extensive clam beds in these areas are subject to dredging.

The U.S. Fish and Wildlife Service has established a walrus research program to complement the State of Alaska's. Other studies are underway and supported by the Sea Grant Program of the University of Alaska.



AMERICAN NATURE STUDY SOCIETY
Crayton Jackson
Rt. 5, Box 764
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