

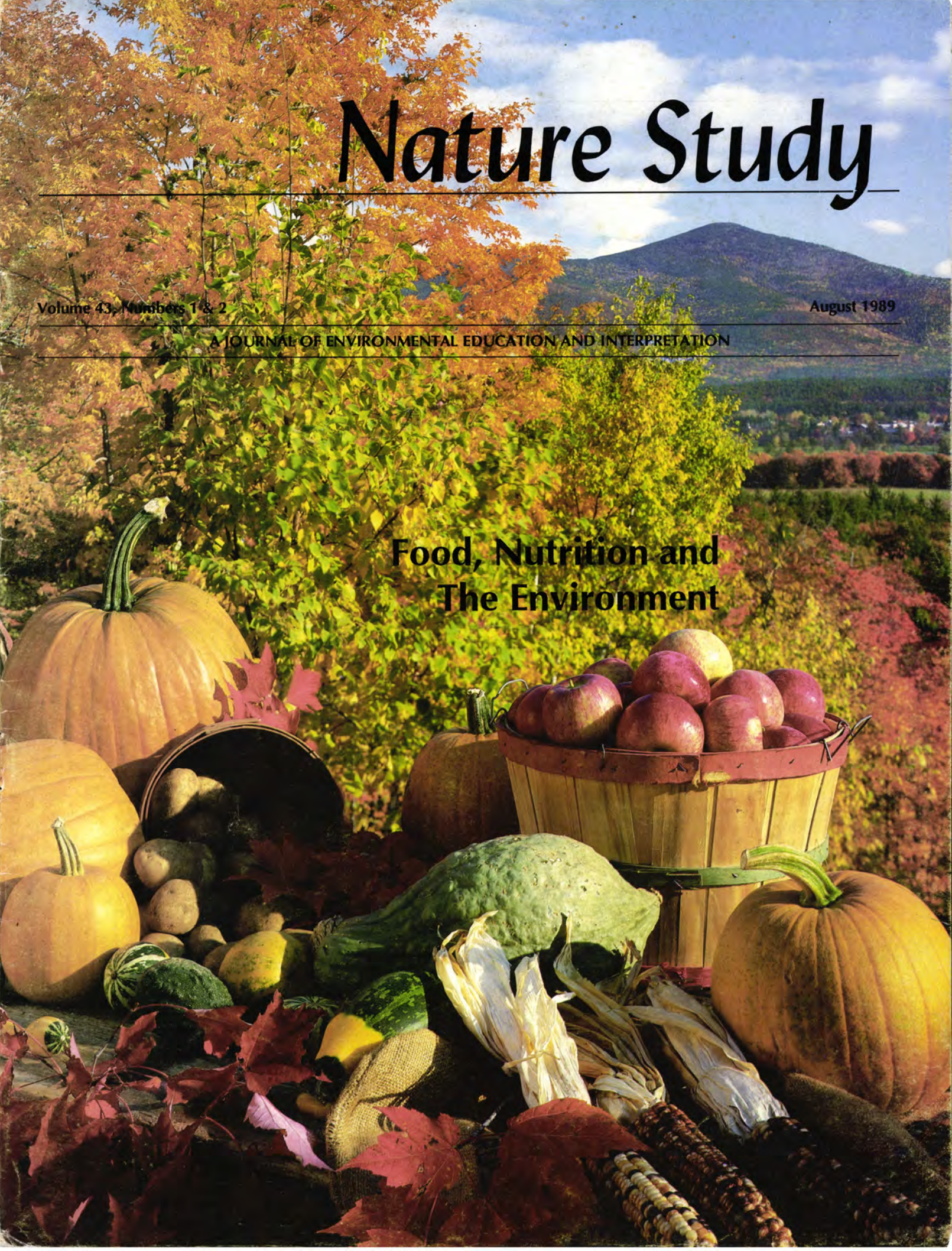
Nature Study

Volume 43, Numbers 1 & 2

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A JOURNAL OF ENVIRONMENTAL EDUCATION AND INTERPRETATION

**Food, Nutrition and
The Environment**



President's Message



Paul Spector

Today's society faces a great variety of environmental problems and yet, none is more basic to our well-being and ultimate survival than the concerns related to food, nutrition, and the environment, the theme of this issue of NATURE STUDY.

At so many different levels of our biological, psychological and social existence, food and nutrition become our most intimate association with our environment. Liberty Hyde Bailey recognized this relationship when he wrote *The Holy Earth* in 1915. "...these materials (vegetable foods) are of the very bone of the land. They grow up with the year and out of the conditions, and they have all the days in them – the sunshine, the rain, the dew of the morning, the wind, the cold foggy nights, and the work of laborious hands."

While Bailey did not write at this

time of the chemicals, pesticides, shortages, etc. that are currently of such worldwide concern, he did fully recognize that the earth and all that it encompasses is an integral part of the food we eat. As simple as this concept may seem, it is one which has become meaningless to a great percentage of today's population. From colossal supermarkets filled with elaborately packaged foods to the prolific fast food restaurants, we are constantly being pushed further and further away from the realization that a healthy environment and the food which it is able to produce, are so closely tied to our own physical and mental health.

We must all be remindful at times of how the degradation of the source of our food supply has a direct and consequential effect on our well-being. The articles which follow help us to recall the basic relationships between the earth, the food which it is capable of producing, and those who reap its nutritional and life-sustaining value. Through the efforts of many individuals and organizations, people's understanding and appreciation of the earth and its bounty continues to be developed, helping to ensure that these critical relationships are never forgotten. □

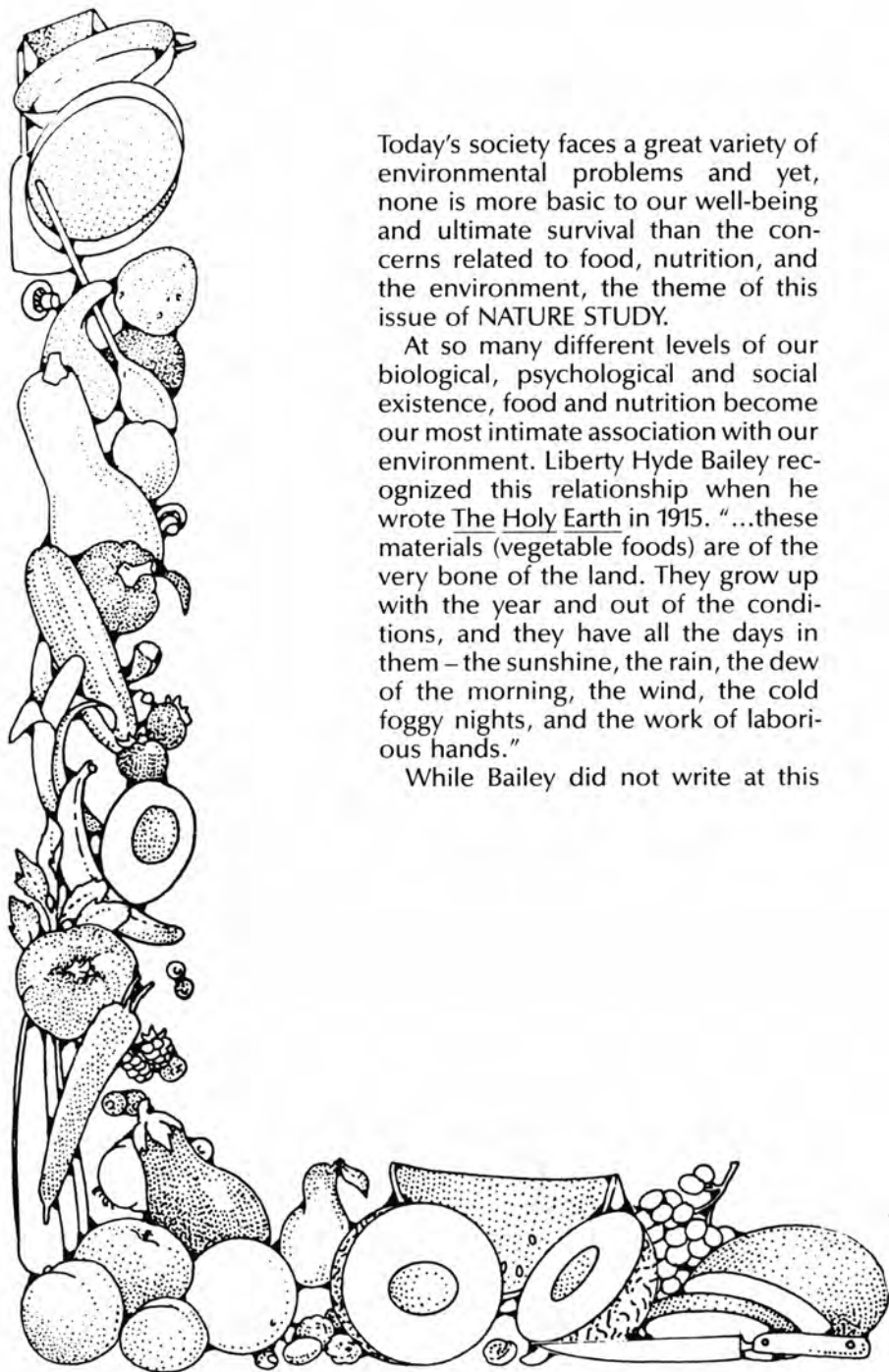


Table of Contents

Volume 43, Numbers 1 & 2

**Inside
Cover**

President's Message
Paul Spector

1 Food, Nutrition and the Environment

Helen Ross Russell

Unless we care, earth's web of life
will become a web of death.

2 Our Diets Are Threatening Our World

Richard Schwartz

Meat-oriented diets are damaging the
earth. Each fast-food hamburger
requires the destruction of 55 square
feet of tropical forest for grazing.

3 Endangered Seeds

Lenore Miller

Where is that huge thin-skinned juicy
tomato of yester year? What else are
we losing and why?

5 Garden Magic

Beth Benjamin

"If children do not bond with the
physical world of nature what will
nature mean to them?"

Food, Nutrition and The Environment



6 Plants Grow Better People

Karen L. Smith

Plant therapy helps heal, stimulates
friendships, provides challenges that
can be met, and offers comfort and
pleasure

Table of Contents (cont.)

7

From Butterfly to Beetle-Wise

J-P Malocsay

First-hand experiences are needed to open the door to a better tomorrow.

8

Environmental Literacy: Philosophy/Content/Strategies

Verne Rockcastle

What all our students should learn.

10

Spring in Arizona

Jean C. Smith

A dozen ANSS members travel through the life zones of the southwest and encounter blooming cacti, 13 varieties of hummingbirds, a long history of human relationships to the earth and much more.

15

What Do They Eat? Diets of Urban Birds

Steven D. Garber

Birds that survive in the cities do so because they find the food they have always eaten

17

Environmental Education Tips Squid, A Neglected Resource

Bernice Bunny Nadelman

The Squid, an under utilized sea food source, makes a great classroom study.

18

Kitchen Biology

Lenore Miller

Delectable dissections
Your neighborhood food store can be the starting point for hands-on lessons in botany and zoology.

20

Good Reading

- **The Heart of the Valley**
Reviewed by Arthur Currence
- **The Sierra Nevada - A Mountain Journey; Land and Resource Planning in the National Forests; Last Stand of the Red Spruce**
Reviewed by John W. Brainerd
- **Food First Curriculum**
Reviewed by Glenn O. Blough
A resource rich in scientific and social studies activities

back cover

Naturalist's Notebook
Robert M. McClung
Back Pasture of an Old
Pennsylvania Farm

Food - Nutrition - The Environment



Helen Ross Russell

Starvation - Soup Kitchens - and Nutritional deficiencies in the U.S.; our unique Planet Earth, rich in beauty and resources, is in trouble.

Fifteen McDonalds are opening in Trinidad bringing to that beautiful country destruction of its culture, of dignity and of the environment.

Cheap beef for most quick food comes from cattle grown where tropical rain forests have been cleared. The web of life becomes the web of death, a web of ignorance and greed.

Brazil: first cleared forests to settle people from barrios on the edge of cities. Today the soil is leached and eroded; and the destruction of ancient Indian cultures by habitat destruction and by actual killing of whole native communities is appalling. Plants and animals are becoming extinct before they are even "discovered".

Nicaragua: forests were destroyed by U.S. lumber companies who paid the dictator, Somoza, bribes which freed them to clear cut and not replant. Today young forests, replanted by the villages, are frequently torn up by the Contras to destroy the economy and morale of the people.

Annual rain forest destruction worldwide equals an area the size of Ohio and takes place in Asia, Africa, South America, Central America, Hawaii, and the Phillipines. Where will we obtain our three pounds of oxygen per person per day as rain forests disappear and we pollute our oceans?

The web of life knows no geographical boundaries nor does the web of death. Selling of pesticides banned in the U.S. to countries keeps U.S. industry flourishing, but what of birth defects and death to users? What of us in the U.S. as we buy the pesticides in the skins of imported fruit and vegetables?

Asparagus in September, and other exotic foods for gourmet feasting, are produced for export in huge land holdings in the Southern Hemisphere while hunger stalks the poor of these

countries. Our shopping habits are part of the web of life - or death.

One pound steaks on menus - means Waste or Waist - and high cholesterol. "Remember the Starving Armenians" not by cleaning your plate, but by taking only what you are going to eat. Who needs a 3/4 pound hamburger, a one-pound steak, a three-egg omelette? Shop wisely, use the money you save in the battle for life. Eat lower on the food chain. It takes 16 pounds of grain and soy to produce one pound of beef; six, to produce one pound of pork.



Does shipment of food to starving people help? Food supplies are often essential in times of major calamities like earthquakes and hurricanes. But food sent to Ethiopia four years ago brought death, destruction and dislocation to the people we reached out to help. Their government used our gifts to move people off their land, to bribe people to turn their neighbors in to face firing squads or torture, or sold the food in the markets for the benefit of the rich and well fed.

Ignorance in giving can be costly to the recipients and the environment. Giving to organizations that have staff in the villages and countryside, that provide tools, seeds, and know-how can help build a web of life, organizations like Church World Service, Food First, Oxfam America and Technica.

But more than direct aid, we must develop an informed world citizenry. Liberty Hyde Bailey wrote The Holy Earth in 1915. It is a classic, challenging humans to care for the earth as it was created and has evolved by taking responsibility for its interwoven patterns and for each other. He wrote of food additives, of war, of international relationships, of human exploitation. In 1953, John Storer wrote The Web Of

Life; In 1962 Rachel Carson wrote Silent Spring, a dramatic reminder that death is also a part of the natural web and that poison and destruction not only move from one group of organisms to another but from one geographic area to another; in 1971 Frances Moore Lappe wrote Diet for a Small Planet, a statement that says that not only are we what we eat but the health and well-being of the environment is closely related to how we eat. All four books are currently in print. What a library!

Unless people everywhere learn to appreciate the messages that these authors have been trying to share with us we cannot save the web of life. All of our school curricula must address the problem--not just in books and classrooms but in reality. I recently taught in a New York City school where breakfast was served. At least one-half of the children threw unopened cartons of cereal, juice or milk in the garbage. (It is "cheaper that way, you only have to hire two persons to run the program"). When someone tried to salvage unopened cartons to take to the needy she was fired. The lesson in that lunch room transcends any classroom learning. Television teaches our young people much more than schools, parents, or religious institutions. What are we doing to counteract the total ignorance, the misinformation and the lack of understanding that programs and advertising foster? Unless we begin to use twentieth century approaches to teaching, become more politically active and create concern about the web of life, it will certainly become a web of death. Finally we must develop an environmental literacy that leads to environmental responsibility in our own lives, in schools and finally in the halls of government. This includes checking the environmental attitudes of candidates, taking our government back from "big bucks," checking, guiding with letters and, when necessary, protesting the actions of our elected representatives. □

Our Diets are Threatening Our World



Richard H. Schwartz

It is becoming increasingly apparent that our planet is facing many environmental threats. Almost daily we see newspaper and television reports related to the greenhouse effect, acid rain, the widening depletion of the ozone layer, the erosion of topsoil, the destruction of forests and habitats, pollution of air, water, and soil, and toxic wastes. It is significant that at the end of 1988, *Time* magazine, instead of choosing its usual person of the year, selected our endangered earth as "planet of the year".

One of the prime causes for current ecological problems, a cause that is generally overlooked, is the wastefulness of meat-based diets:

- (1) The average person in the United States eats almost five times as much grain (mostly in the form of animal products) as does a person in an underdeveloped country. It takes 16 pounds of grain and soybeans to produce one pound of beef on our plates.
- (2) Over 80 percent of the grain grown in the United States is fed to animals destined for slaughter. Half of our harvested acreage is devoted to producing feed-crops. A nonvegetarian diet requires about 3.5 acres/person; whereas, a total vegetarian diet requires only about a fifth of an acre. Hence, a shift to vegetarian diets would free much valuable land, which could be used to grow nutritious food for people, at a time when 20 million of the world's people die annually due to hunger and its effects.
- (3) The standard diet of a person in the United States requires 4,200 gal. of water/day (for animals' drinking water, irrigation of crops, processing, washing, cooking, etc.) A person on a pure vegetarian diet requires as little as 300 gal./day. The production of one pound of steak uses 2,500 gallons of water. Livestock production consumes over 80% of all the water used in the U.S., and this water is becoming increasingly scarce. Studies have indicated that if the entire

U.S. population were total vegetarians, no irrigation water at all would be needed to produce our food. Newsweek recently reported that "the water that goes into a 1,000 pound steer would float a destroyer."

- (4) A nonvegetarian diet also wastes much energy. In the United States, an average of 10 calories of fuel energy are required for every calorie of food energy obtained; in many other countries, they gain 20 or more calories of food energy per calorie of fuel energy. To produce one pound of steak (500 calories of food energy) requires 20,000 calories of fossil fuels, most of which is expended to produce feed-crops. It requires 78 calories of fossil fuel for each calorie of protein obtained from feedlot produced beef. Grains and beans require only two to five percent as much fossil fuel. Energy input to the U.S. food system now accounts for about 16.5% of the total energy budget.
- (5) According to a comprehensive study sponsored by the U.S. Departments of Interior and Commerce, the value of raw materials consumed to produce food from livestock is greater than the value of all oil, gas, and coal produced in this country. A third of the value of all raw materials consumed in the U.S. for all purposes is consumed in livestock foods. As these facts indicate, meat-centered diets are extremely wasteful. The modern agricultural methods related to meat production are a prime cause of the environmental crises facing the United States and much of the world today.
- (1) The tremendous quantity of grains grown to feed animals requires extensive use of chemical fertilizer and pesticides. Much air and water pollution is caused by the production and use of these products. Various constituents of fertilizer, particularly nitrogen, are washed into surface waters. High levels of

nitrate in drinking water have caused illnesses for people as well as animals.

- (2) Mountains of manure produced by cattle raised in feedlots wash into and pollute streams, rivers, and underground water sources. American livestock produce about 2 billion tons of waste annually — more than ten times that produced by humans, and equivalent to the waste of nearly half the world's human population. Food geographer Georg Borgstrom has estimated that American livestock contribute five times more organic waste to water pollution than do people, and twice as much as industry.
- (3) The production of feed-crops for animals is "mining" our soil. Each year over 5 billion tons of topsoil are eroded in the U.S., almost all due to livestock agriculture. In some places, erosion is as bad or worse than during the Dust Bowl period. William Brune, Iowa state conservation official in 1976, warned that two bushels of topsoil are being lost for every bushel of corn harvested from Iowa's sloping soils. In some areas lower yields are occurring due to erosion and the reduction in fertility that it causes.
- (4) Large areas of land throughout the world have been destroyed by grazing animals. Overgrazing has been a prime cause of erosion in various parts of the world throughout history. Over 60 percent of all U.S. rangelands are overgrazed, with billions of tons of soil lost every year.
- (5) The huge amount of grain grown to feed animals require increasing amounts of pesticides. The concentration of pesticides in the body fat of animals due to "biological magnification" contributes to human health problems and costs. Over half of the pesticide residues in the U.S. diet are contributed by meat, compared to only about 10

continued

Endangered Seeds



Lenore Miller

When you hear the word **endangered**, what comes to mind? You might think about pandas, elephants or perhaps spotted owls. These living creatures share a commonality; they are all animals and are easy to visualize. But there is an entire group of less conspicuous living things whose very existence is just as endangered and whose disappearance into extinction would create an even

more serious threat to human life. Those endangered species are **PLANTS**.

At a crucial point in its life cycle, every plant must insure its continuance into the next generation, and pass on its genetic characteristics by producing seeds or spores. To continue that cycle, the seeds which contain this information must germinate and then grow to their own

maturity. In the case of our food crops, most of the plants we eat require human intervention; that is, people must plant the seeds and then nurture and harvest the sprouted plant. Many of the seed plants that were known in the past and were important food crops have already passed over that dividing line into **extinction** and no more of their kind can be brought back to life.

How did this situation come about? We have all heard about the current serious destruction of the rain forest as developing nations cut trees down to sell their timber or convert the land to farming or grazing uses. But there are other, more subtle, forces at work too. Our modern age has brought with it larger populations, advanced technology and radical changes in farming practices. Fewer farms now produce more food using these new techniques. Farmland is being converted into shopping malls and condos. Machines have taken over much of the arduous hand labor. Chemical fertilizers and pesticides have increased the yield of crops per acre to produce more food, as have new laboratory-developed plant varieties. Some of these newly created seeds have actually been patented! Farming has become big business. In this country, the small, family-owned farms are gradually passing away except for a few tenacious independents. Even in the poorer nations, subsistence farming (where the family works to produce only its own needs) is giving way to cash crops and huge company-owned tracts.

The movement of large conglomerates into the farming business has even resulted in their purchase of the small seed companies; Burpee Seeds is now owned by ITT! So the big companies now not only control what seeds they will develop in their labs and sell to the farmers, but also the production of the chemicals that are necessary for the growth of those plants.

In the past, farmers would keep a portion of their harvest as seeds to be planted the next growing season. Thus, they could pass the seeds from

Our Diets (cont.)

percent contributed by vegetables, fruits, and grains. Ninety-nine percent of U.S. non-vegetarian mother's milk contains significant levels of DDT, compared to only 8 percent of U.S. vegetarian mother's milk.

- (6) Demand for meat in wealthy countries also leads to environmental damage in poor countries. To save 5 cents on a fast-food hamburger exported to the U.S., the earth's tropical rain forests are being bulldozed at a rate of 100 acres per minute, a rate which could destroy an area the size of Pennsylvania every year. Each fast-food hamburger patty requires the destruction of 55 square feet of tropical forest for grazing. Half are already gone forever, and at current rates of destruction, the rest will be gone by the middle of the next century. What makes this especially serious is that half of the world's species of plants and animals reside in tropical rain forests, and some might hold secrets for cures of some of today's deadly diseases. Also, reduced rain forests would alter climate and reduce rainfall with potentially devastating effects on the world's agriculture.
- (7) Slaughterhouses are also prime sources of pollution. One study revealed that 18 meat-packing companies in Omaha, Nebraska, discharge over 100,000 pounds of grease, carcass dressing, carcass cleaning, intestinal waste, paunch manure, and fecal matter from

viscera into the sewer system that empties into the Missouri River.

When we consider all these negative environmental factors, and then add the very harmful effects related to human health and global hunger, we can safely assert that next to the threat of nuclear war, flesh-centered diets and the livestock agriculture needed to sustain it are the greatest threats to global survival today. Also, while hopefully nuclear war will never occur, the negative effects of meat-based agriculture occur daily. Hence, in order to reduce the many ecological threats that increasingly threaten our nation and the world, it is essential that people move toward vegetarian diets.

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Endangered Seeds (cont.)

generation to generation, perhaps selecting those plants that exhibited desirable traits, like taste and texture. Agri-business is by definition more profit-motivated and their selection of traits would more likely be for better appearance, longevity of storage or transportation, pest resistance, machine-harvestible, etc. Taste is not a prime concern.

Why is this loss of seeds so important to us all? Not only are we losing many of our delicious-tasting plant varieties, but there are hidden dangers as well. When a giant farm plants acre upon acre of identical plants, that crop becomes highly vulnerable to epidemic; one virus can wipe out the entire crop (remember the Irish potato famine of the last century?) This **monoculture** also leads to a loss of variety. A taste of the tomatoes available at supermarkets is a good example of what has resulted from emphasis on profit-producing traits. Moreover, increased dependence on chemicals and irrigation has damaged

our nation's water supply. We are even losing plants that have as yet to be discovered and identified, and their use determined; when these plants become extinct, so do their genetic traits many of which could be useful for cross-breeding.

What can the homegardener/hobbyist do about this loss of our botanical inheritance? First, be aware that seeds and plants are endangered. Do not take for granted that the plant varieties we currently enjoy will always be around. Even now, many are already gone forever. Oppose plant patenting legislation; support government funding for seed storage facilities and the search for vanishing plant species. For the active gardener, the most positive action would be to join seed preservationist groups that exist all over the country in an effort to counter the loss of species. One of the most respected of these is The Seed Saver's Exchange, whose director, Kent Whealy started the movement. The members of the exchange

trade, plant and collect the seeds of endangered plant varieties, thereby saving them from extinction. You can contact the exchange by writing to: Seed Saver's Exchange, 203 Rural Avenue, Decorah, Iowa 52101.

With a growing network of flower, fruit and vegetable backyard gardener/preservationists, perhaps many more seeds and the plants they produce will survive into the next centuries to delight the eyes and palates of future generations.

Lenore Miller is an elementary school teacher and environmental educator in the NYC schools. □

Seed Viability
How many years can you save seeds?

Beans	3	Parsley	1
Corn	3	Peas	3
Cucumber	5	Peppers	2-4
Eggplant	4-5	Pumpkin	4
Lettuce	5	Squash	4
Melons	4-5	Tomato	3-5

Children's Garden Symposium



About the time you receive this issue of NATURE STUDY the Brooklyn Botanic Garden in Brooklyn, New York will be celebrating the 75th anniversary of its Children's Garden with an important symposium, of which ANSS is a cosponsor. Presentations and workshops will be held on September 10-12, 1989, with field trips to children's gardens, playgrounds and school yards in the New York City area. The Brooklyn Botanic Garden Children's Harvest Fair will take place on September 9.

Thousands of inner-city children have been able to make the important connections between the food they eat and the soil, water and air from which it comes by growing their own vegetables in Brooklyn (and in many similar projects throughout the country). This experience in "plain dirt gardening" really has no satisfactory substitute when it comes to developing attitudes and values – the theme of this issue: **Food, Nutrition and the Environment**.

We congratulate the BBG at this significant milestone. The School Garden movement at the turn of this century was an important aspect of ANSS activity right from the beginning, and continues to merit our encouragement. □



Carol Morley

Garden Magic

All photographs by Beth Benjamin



Beth Benjamin

When the Camp Joy garden project came into being in 1971, our main concern was to take care of a piece of land, and to grow beautiful healthy fruit, flowers and vegetables both for ourselves and for sale.

The woman who offered us the use of her land had grown up across the street and had always wanted to see a farm in the empty field. She was also entertaining notions of building a trailer park, but luckily she read an article about the organic garden at the University of California at Santa Cruz where we were working. This project had received a great deal of positive publicity, and she proposed that we do something similar with her property.

It seemed like a rural area, but in fact the land was close to a small town which serves as a bedroom community for the commuters who drive 15 miles west to Santa Cruz on the coast, or 45 minutes east through the mountains to the high tech industries of San Jose and Santa Clara, or even as far as eighty miles north to San Francisco. We felt fortunate to be able to work at home, particularly with such arable land, as most of the area is either sloped quite steeply up from the river, or deeply shaded by redwood forest. It was an unlikely place to farm, but we were convinced that the consumer commuters of suburbia needed to see their food growing and begin to grow some of it themselves.

In the first two years we established the huge garden; the raised beds overflowed with a diversity of vegetables, herbs, and all types of flowers. The garden was formally laid out, with criss-crossing paths, grape arbors, rose trellises, and a gazebo in the center which provided welcome shade and a lovely area for assembling produce to markets and restaurants and we began to supply flowers for weddings and other festivities. We increased one hive of honeybees to several hundred. All the buildings were built with recycled lumber and volunteer labor by people who were willing to work for room and board. As we met more and more people who

wanted to learn how to grow their own food, we developed a curriculum for an apprentice program. We incorporated as a non-profit organization and were able to accept donations to assist with program development. After two or three years, the owner offered to sell the land to us, and a man who was impressed with the ideals and accomplishments of the group purchased it from her and donated it to us as a tax write-off.

By this time it was clear that the demonstration part of the garden was very important. Backyard agriculture was a new and interesting concept to many people. We enjoyed showing them that significant amounts of food could be grown at a home without harmful chemicals and with a great deal of fun. A large part of our work now is teaching classes and workshops and running the apprentice program. Many of those who have worked at Camp Joy have gone on with horticulture in different ways, both part-time and full-time, either

actually producing food, or teaching, or working in other related areas. All still have retained their sense of connection with the earth from their time with us.

Now there is a network called the Friends of Camp Joy that buys most of the produce through a subscription program. Members pay a small fee to help get the season started in exchange for low prices when crops are in. They pick most of their own food and attend several work days to help make compost, sow fall cover crops and make the dried wreaths and herbal vinegars that are sold at the annual harvest open house in November.

As our own children grew old enough to attend school, we realized something important. The children of school age today are probably the grandchildren of people who couldn't wait to get off the farm, the generation that felt that technology was providing freedom from farm labor drudgery. Their parents are the people who grew up in the heyday of high tech, an era when we felt we had progressed beyond Nature and that humans could fix everything. These are the children who will come to adulthood in a world where the environmental damage and pollution caused by the arrogant and ethnocentric attitudes of the recent past will become the central issue of the age. The disasters we are beginning to hear about are only the tip of the iceberg. These are the children who are going to have to save the world, literally. But they are missing some important information that they will need.

If a child grows up without love and nurturing it will profoundly affect his ability to achieve love and intimacy in adult life. He will be self-centered, and lack an inner sense of his connection to the human race. In the same way, if children do not bond with the physical world of nature, what will Nature mean to them? We are all children of the Earth, but if we do not touch her and smell her and taste her and love her, what will "the environment" mean to us? If a child's closest experi-

continued to page 14



These children know that their food supplies are rooted in the soil.

Plants Grow Better People



Karen L. Smith

Plants have long been recognized as essential nutrition for the body but health care professionals have come to recognize their value to the mind and spirit. The Holden Arboretum's horticultural therapy program has been combining the use of plants with special-needs individuals for over 30 years. During this time, professionally trained horticultural therapists have instigated indoor and outdoor gardening programs with health care facilities serving the visual and hearing impaired, mentally retarded, physically disabled, psychiatric patients, adults, children, and the elderly.

In the most general of terms, horticultural therapy programs seek to improve the mental and physical health of its participants. Each program is structured uniquely to emphasize the needs of its participants.

For example, an individual with rheumatoid arthritis experiences pain, swelling, and stiffness of joints, pain in muscles, spasms, fatigue, and weak-



with horticultural activities. Many live alone, have experienced the loss of a spouse and/or friends yet are physically healthy themselves. The Senior Horticulture group is designed to encourage seniors to maintain their own social support system, a system that makes coping with the process of aging easier. The opportunity to make new friends with common interests, to renew an interest in gardening, or branch out into new interests encourages them to stay active physically as well as socially. Horticulture topics are addressed, as are health concerns such as using herbs to create no-salt seasoning substitutes. We have found that group participants do maintain contact with each other outside of the group's regular meetings.

"When the world wearies and ceases to satisfy there is always the garden" (The Rocky Mountain Horticultural Therapists). The garden has been a retreat from the stresses of life for generations. The green and growing environment affects us all in many ways. The change of the seasons, the anticipation of the first crocus in spring, the taste of the first harvested tomato, and the smell of a favorite lilac bush are examples of sensory stimulation resulting from our environment. Feeling comfortable with your environment, being able to anticipate change, to desire to live in the present rather than the past and look forward to tomorrow, can all be influenced by our physical surroundings. Many health care facilities are addressing this issue by developing landscaping that invites interaction among its residents and is designed to accommodate special needs.

One local Alzheimers care facility features a barrier free garden for its residents. It includes specialty areas of interest such as fragrant plants, old fashioned varieties to stimulate memories, quiet, secluded meditation areas, as well as community garden and activity areas. Most importantly, the garden is safe even for confused patients and completely visible from

continued to page 22

ness. The patient must exercise to retain flexibility, range of motion, and to prevent joint stiffness. The horticultural therapist utilizes indoor and outdoor gardening projects to motivate the patients to move painful joints. Because they enjoy growing plants and related activities, they are likely to move more than they do with conventional exercise.

Emotional and social needs are often targeted by horticultural therapy programs. Psychiatric hospitals were one of the first institutions to include horticultural therapy in their treatment programs for both adults and children. In fact, doctors at the Menninger Clinic, Topeka, Kansas were among the first to document the expedience of patient improvement over those who did not work in the garden.

Today's adults are living to an older age, staying healthy, and maintaining their independence longer. This trend creates changes in the social structure of older adults. The Holden Arboretum offers an alternative to this group that combines the social and emotional issues of the "well elderly"

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From Butterfly To Beetle-Wise

J-P Malocsay

This quiet wet morning in mid-July a Mourning Cloak butterfly flew down to settle on the dark green wood of the porch at my feet. Like many of the brush-footed family *Nymphalidae*, it opened its wings in a perky, quick-getaway vee and took a droll little walk as if to mark the spot with its show of dusty black velvet bordered so thrillingly with gold and small blue dots. Then suddenly it was up off over the wambling roof of this ancient house and back down again to the selfsame spot. Again a brush-foot stroll. Then off again and gone gone gone.

Nymphalis antiopa. I've come inside to catch that lovely name from A FIELD GUIDE TO THE BUTTERFLIES by Alexander B. Klots. My thumb-worn copy dates from 1951 when I was eleven and would have given much to see a living Mourning Cloak. Oklahoma has plenty of elm and poplar and willow and rose for larval food; but a butterfly, like the heart, has its reasons...

I had to be content with a single battered specimen plucked up by a storm in New England and blown to me across the Ozarks. Or so I imagined the passage of that Mourning Cloak. Ragged with regret, I fondled its glorious remnant, consoling myself with text. According to Mr. Klots, *Nymphalis antiopa* was downright common out East, though a heart-breaker rarity elsewhere too: "As the 'Camberwell Beauty' it is a famous and greatly prized species in England, where it occurs only as a rare migrant from the Continent."

Eleven is an age of fierce desire in a collecting way. (What a mercy we prefer to see the living specimen and to roam their habitats nowadays, to trophies kept indoors.) In 1951, I couldn't lay hands on many butterflies of my heart's desire, so I read books and pored over pictures, laying up names in memory, in reverence and in hope. Those feelings stir again this morning, thanks to a butterfly showing itself, bringing life to its names on the page: *Nymphalis antiopa*, Camberwell Beauty, Mourning Cloak.

I resist the temptation to fetch my net, even though a Mourning Cloak in hand would please my mother no

end out in Oklahoma. Maybe some day when I can be sure of seeing twenty in a morning I'll be able to pay her that tribute. Back in the '50's when she labored early and late in full high tide of motherhood, I about drove her nuts with my butterfly natter. (Only my tropical fish natter could have been worse.) Now Mom is free to play all day in house and garden where in fact the comings and goings of butterflies and birds are much of her news.

Even now, her masses of fragrant white Phlox will be calling in many more kinds of butterflies than I see in this Berkshire garden. Of swallowtails alone there will be Tiger, Black, Spicebush and Pipe Vine. Sulphurs Clouded and Cloudless will come and go with Monarchs, Viceroy's, Red Admirals, Painted Ladies and occasional Fritillaries, Gulf and Great Spangled. Cabbage and Checkered Whites will of course consort with tiny Blues and Coppers and Hairstreaks. Mettlesome Skippers of a dozen kinds will be rising and falling in dogfights above the flowerheads. In favorite haunts nearby there will be Tawny Emperors, Hop Merchants, Commas, Question Marks, Wood Nymphs, Satyrs, Snouts -but it isn't nice to brag.

I offer those beauties in common name only, wanting to pin down in an everyday sense. Besides, they're all there in my Klots FIELD GUIDE and many another as well. Just now I'd like to add half a century to my copy of 1951 and ask: year 2001?

The answer, naturally, is: Plenty.

I like to think that the tragic environmental errors of our recent past will yield a wiser, more sensitive Twenty-first Century Gardener--one with a basic and lively sense of the rights of humans and earth together. Surely the watchword then will be cooperation, not domination. Then maybe self-defeating warfare ought to yield to a more far-sighted peace based on a shrewd enlistment of natural rhythms and balances.

Gardeners, of course, will always be choosers; and also ambitious, fussy, and domineering as all get-out. We are the original refugees from Paradise and will let you know it the minute

some entirely natural event threatens to spoil our show. And no wonder. Isn't a garden an exercise in freedom of choice? And don't we work like slaves to make our choices add up to someplace wonderful?

So yes. The firm jawline of Maximum Control will show itself as gardeners continue to function as excitable curmudgeons frequently on the verge of committing insecticide of one sort or another. What will change will be the kind, as biological control using natural enemies is better known and understood, along with strategems of timing and brute force applied at aphid levels, as it were.

I'll spend tomorrow morning with seven gardeners set to flourish in 2001. They range in age from four to eleven now, and we will linger down yonder by the pond. I've been foiled of a desire to show them dill and fennel shared with the handsome caterpillars of the Black Swallowtail near the Children's Learning Garden. (Why won't those swallowtails arrive to claim their own?) Instead, we'll discover a Japanese Fantail Willow slightly ragged here and there, thanks to a Red Spotted Purple I watched glue single eggs to leaves a week ago. We'll discuss the difference between a willow with plenty of leaves to spare and roses suffering too much damage up the hill where Japanese Beetle pheromone traps hang in the apple trees.

Last week we handled some of those handsome beetle varmints (frozen for better holding still) by way of understanding what we do kill and why. We looked for living beetles then to see how they hold up legs in threat (like chilly bumblebees) before they drop and fly away fast. On hand was a trap left over from last year, chock full of its take. We poured out a quart of beetle shells. They tinkled, falling through our fingers like coins of buried treasure shining bronze and green and gold in the sun. Then they passed from our respectful curiosity and rue--to hope of new life via the compost heap.

These kids are sharp as tacks. They mop up facts in a way that suggests the world may yet be safe for common sense. And for nature, too, in a garden way. Yes, definitely. □

J-P Malocsay is the director of education at the Berkshire Garden Center in Stockbridge, MA

Environmental Literacy



(What Our Students Should Know and Be Able To Do)

Verne N. Rockcastle

Philosophy/Content/Strategies

Excerpts from paper presented to the
Pennsylvania Environmental Programs Association
Shippensburg University, March 11, 1989

Environmental literacy is an understanding, at some basic level, of the **interaction** of humans and their natural environment with regard to both living things and non-living things (air, water, soil, and rocks.) The interaction implies taking from as well as putting into. It includes what humans do with, to, and for plant and animal life, as well as what plant and animal life does in response to human intervention. There is hardly a human activity that leaves no consequence to both the biota and Earth's mantle. The interaction includes short- and long-term subtleties as well as gross and obvious causes and results. Environmental literacy is an awareness and an understanding of the basic relationships in the interaction.

There is a broad spectrum of environmental literacy, from total ignorance or unawareness to deep, thorough understanding and con-

cern. There is also a broad spectrum of involvement and responsibility, from unintended carelessness and wanton disregard to personal dedication and life-long commitment. The vast majority of people are unaware, illiterate, ignorant of the most basic interactions between humans and their environments. They just never knew or thought about the by-products of simply living, for example. They just never considered the long-term effects of their mode of transportation, or their recreation. It is not that they don't care; they just were never educated or enlightened.

There is still another segment of humanity who may care, who are knowledgeable to various degrees, but who are either unaware, unconvinced, or caught in a biological, social, psychological or religious routine that precludes conscious population control. They are parents for whom population control has low or no priority. Environmental literacy must take into account the human foible of multiplication.

Some humans, unfortunately, are knowledgeable but callous, irresponsible, greedy, or self-centered in their relation to their environment. Environmental literacy must address these individuals, some of whom are in positions of such responsibility and power that their views, pronouncements and practices account for environmental degradation of serious magnitude.

Then, fortunately, there are a few who are knowledgeable, insightful, foresightful, and committed, both personally and socially, to an active role in improving environmental quality and educating others. At present, these people constitute a minor fraction of society. Some operate quietly,

without fanfare. Some are in positions of leadership. But wherever they are, whatever their *modus operandi*, they should be cloned. At the least, their understanding, and their commitment to action, should be proliferated.

Environmental awareness, then, is broad; it is complex; it encompasses biological and physical science content; and it crosses social, religious, ethnic and economic lines. Environmental literacy does not mean complete agreement on either scientific principles or social and economic issues. Rather, it means **awareness** of what happens when humans act in a certain way. When awareness is assured, only then can action be contemplated and implemented.

Probably the first and most basic input for environmental literacy is a solid grounding in science — biological, physical, and earth.

I think it is time to consider a biology for environmental literacy that includes enough of the chemical and cellular basis of life; of systems and control; of continuity, diversity and change; of populations and communities; and of the kingdoms of life to meet the most basic **needs** of a literate society. But also a biology that includes something of the natural history of common organisms. It is not enough that students rote memorize chemical processes, molecular structures, and complex routines. They need to **experience** organisms, **observe** their habits and reactions, and get to **know them** intimately.

It is even more important to consider a different physical science course for the average citizen, and physical science is as important as biological science in environmental literacy.

Physics and physical science in gen-

(Editor's Note: When Craig Chase, former ANSS President, recommended we print Dr. Rockcastle's piece, we were skeptical: at 4000 words it was too long; it was addressed to an academic audience; it didn't seem to fit our Journal theme for this issue. But after we read it, we realized that the problems of food, nutrition and the environment can only be solved as we develop environmental literacy! If Dr. Rockcastle's kind of philosophy, methodology and content permeated early education, students would not be arriving at college as environmental illiterates! So, with some judicious shortening, we present it to our readers to promote thought and provide teaching ideas.)

eral should be presented in a "This is your life!" manner. It should be related in a "So **that's** how it works!" way to many common experiences that one has in normal living.

You might ask **why** erudite topics should be covered, when the conventional topics provide more grist for the intellectual mill. It is because topics relating to everyday experiences, to lifestyles, to commonplace interactions in the physical environment, elicit observations, reinforce concepts, and insure continued and deepening understanding.

The same is true for chemistry. The average citizen can no longer be ignorant of the basic chemistry of **living**. Such fundamental phenomena as the recycling of materials; the processes that occur in the kitchen, the automobile engine, the furnace; the corrosion of car fenders; something about polymers, power sources, and processed foods — all are proper topics for chemistry for the environmentally literate.

When the basic science content is made to relate personally to the lives of the students, then the likelihood of environmental literacy will be enhanced. And when the content is made personally **quantitative**, the likelihood is even greater.

This need not involve major changes in curriculum. Rather, I believe that introducing a few, telling, simple, but dramatic, investigations or activities as a part of a regular course sequence would be helpful in producing environmental literacy. The activities could be as simple as giving out a 12 cm. × 12 cm. piece of aluminum foil, having the student mass it, and then in the course of a week do everything possible to "destroy" it. But at the end of the week, what was done, and its effect on the mass of aluminum, should be reported. I don't see how one can casually toss away aluminum foil after this, knowing that it simply does not biodegrade, or any other kind of degrade, easily. And the frequency with which one meets up with, and uses, aluminum foil, is bound to reinforce both concern and mini-actions as a result.

Environmental literacy cannot be developed only by personal experiences. Sometimes the posing of "What if?" questions can stimulate thinking, which, when channelled and

shared, lead to deeper insights and concerns, and ultimately to commitment and action. For example, "What if kids could be persuaded not to accept McDonald's hamburgers when presented in styrofoam containers?" How could a class in psychology, for example, be challenged to come up with suggestions for a lesson in school, or an ad, or a home exercise, that would make children conscious of, and perhaps antipathetic to, containers that are detrimental to their environment? Wouldn't this, in itself, cause a change in the attitude, and thus the **behavior**? Isn't this as valid an assignment in psychology, social psychology, or educational psychology as some less pointed, and far less environmentally slanted assignment?

There is another factor in environmental literacy that should be addressed. It is that of personal contribution to a social condition or problem. Today people feel that they have little if any effect on the total environment. I can remember one student who very much wanted to write and take issue with Dan Rather, but said, "He'd **never** get the letter!" I protested that if he wrote a really thoughtful, creative letter on letterhead, Dan Rather **would** get it. But the student protested that the chances of **his** letter getting through were so slim that it wasn't worth his effort. I even bet him 10 to 1 that if **we** worked over a succinct, thoughtful, documented letter it **would** get through. But he never wrote; he considered himself to be too insignificant a part of the whole.

This attitude must be obliterated if environmental literacy is to be worth much. How many people accept plastic instead of paper "because one bag isn't going to change the world?" But this microinsulation from a population practice is defeating! And there are ways to deal with it in science and social science. Let's consider one simple activity in physical science that I, myself, use with kids to help dispel the notion that the individual doesn't count.

Imagine a gallon-size, plastic, food storage bag taped to a drinking-straw so that the bag inflates when one blows through the straw. Now imagine 12-15 of these bags placed flat around the edge of a folding table about 1 m. × 2 m. with the straws projecting beyond the edge of a second table

inverted over the first. A large (very large!) person gets on top of the upper table, while classmates take places at the drinking straws. At a signal, those around the table blow **simultaneously** through the straws. The upper table rises with the heavy person on it, to the delight and cheers of the blowers. The point is that, while any single bag is weak and cannot support a massive load, a group of them in concert exerts tremendous force. A group of citizens, acting in concert, are just as effective in bring about a desired social or environmental result.

Recently, Congress was about to "vote" itself a sizable raise by simply doing nothing before the 8th of February. People all over the country were incensed, but they felt there was little they could do. I purchased lots of postal cards, wrote a letter for the editorial page — a letter containing the names and addresses of whom and where to write — and asked people to write. Most said, "It won't do any good!" But it did! Because enough people convinced enough **other** people that when a critical mass of the little bits become involved, the mass has to move. That conviction of "I **do** count, and I **can** make a difference" — is one of the principle convictions of environmental literacy. It must be part and parcel of any curriculum that claims environmental literacy as one of its goals.

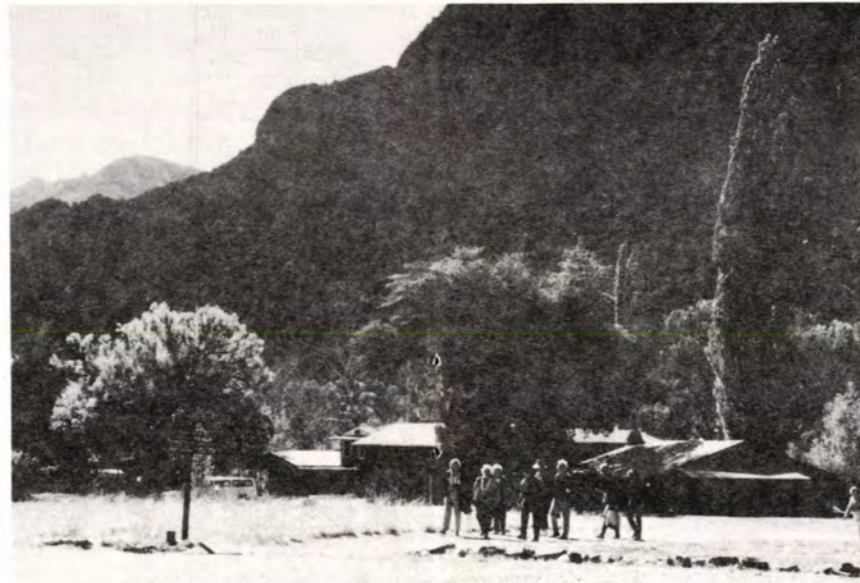
There is one other facet of environmental literacy that I should mention — the experience of being caretaker for an organism throughout a good share of its life-span. The organism must be small with a fairly short life-span. It must require a minimum of time and attention. It must be interesting, fairly non-revulsive, non-smelly or messy. And preferably it should be something that can be released safely into the local environment after a reasonable period of time.

What kinds of organisms fit such a picture? Dragonfly nymphs are one. They can be kept in a shallow pan of water, and fed bits of animal matter such as flies or specks of raw meat. There are few organisms so easy to keep, or so completely captivating when they emerge from their nymphal "case." To observe the wrinkled, compacted wings extracted from the wing pads, then unfold and pump out to

continued to page 22



Birders



American Museum of Natural History, Southwest Research Station.



Helen sharing her "Treasures", Ryolite Hailstones.



Chiricahua National Monument

SPRING IN ARIZONA:

1989 ANSS Field Trip
Jean C. Smith

Helen and Bob Russell and Ray Pfortner, our co-leaders, chose the best time of year to guide nearly a dozen lucky ANSS members on a trip through the Life Zones of the American Southwest. It was April, the height of the spring bird migration and the blooming of the western desert plants.

As two members of the group left Rochester, New York, on April 10, 1989, a late spring blizzard was raging in the area, but a balmy evening breeze greeted them as they deplaned a few hours later in Tucson, Arizona and met the co-leaders and other field trip members.

The first stop out of Tucson was the incomparable Arizona Sonora Desert Museum. A half day here provided an opportunity to review the ecological communities of the Life Zones of the regions we were to be visiting over the next several days. At the museum, we also observed first-hand many live plants, birds, reptiles, and mammals indigenous to the region.

After lunch at the Museum, the group reboarded the two roomy Dodge Caravan vehicles and headed East toward the Field Research Station of the American Museum of Natural History located in the Chiricahua

Mountains of southeastern Arizona within the boundaries of Coronado National Forest.

Our trip took us first through the Lower Sonora Life Zone where the desert landscape consists of a profusion of Palo Verde with its striking green bark and lovely yellow blooms; low dark-green Creosote with its tiny green leaves and yellow flowers; and the brilliant orange-red blooms of the long-branched Ocotillo Cactus (said to be the "Burning Bushes" of Moses' time). The tops of the giant Saguaro Cactus showed a few colorful blooms with many others just ready to pop open. We learned that the picturesque Saguaros are pollinated by bats. The roots of both the Saguaro and the Creosote give off a poison that inhibits the growth of other plants in the surrounding area that might shade and discourage growth below. Prickly Pear Cactus with its long spines and profuse yellow flowers, as well as the Cholla (Buckthorn) Cactus, was also plentiful. Interrupting this desert scrub from time to time, one could see the taller green cottonwoods that revealed riparian areas, the location of streams, or dry stream beds.

continued to next page



Sonora Desert



Prickly Pear Cactus



Squaw Root

NOTE: Editorial assistance By Betty J. McKnight

Unexpectedly, the hot, dry desert was interrupted by rocky cliffs with huge red boulders as we gained some altitude and entered the Texas Canyon. This was perfect setting for a cowboy and Indian movie.

Amid this picturesque landscape, in a cool grove of trees, was situated a small jewel of a museum, the Amerind Foundation Museum, exhibiting the history, art and culture of the early people of the area as well as the more recent Native American inhabitants. Some artifacts were carbon dated at 9500-5500 BC.

Leaving the museum, we continued our journey. As we gained altitude in the Upper Sonora Zone, there was another unexpected sight for many of the Easterners. We were seeing acres of vineyards, groves of Pecan and Pistachio, and plowed fields which were ready to be planted to cotton – one of Arizona's important field crops. This agriculture, we could see, was made possible in this desert region by extensive irrigation systems.

Desert Broom, Sage Brush, and Tumbleweed were plentiful as the foothills of the Chiricahua came into sight through the dust of the country dirt roads. Keeping a respectful distance we stopped to take a closer look at a large rattlesnake on the road. Back in the cars again we continued our journey. A Curved-bill Thrasher watched from a fencepost as our vans passed through the tiny crossroads of Portal, Arizona, near the border of New Mexico.

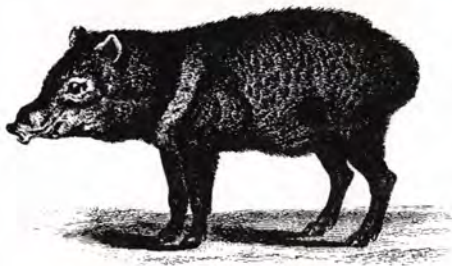
The Southwest Research Station of the American Museum of Natural History was the perfect setting for our stay with its comfortable cabins, delicious meals (including some great vegetarian recipes) hospitable staffers and researchers who shared their experiences thru evening programs.

The sun was low in the sky as we turned South into the canyon that led to the Research Station. Nothing that Helen had told us had prepared us for the breathtaking view as we entered the grounds. The setting sun was reflecting red and gold from the cliffs of Silver Peak and Portal Mountain which encircled a landscape of bright green grass, tall Poplars, and stark white Sycamores.

Dr. Wade Sherbrook, Director of the Research Station, talked about the history of the area from 1879, when his

cabin home was originally built, through 1950 when the Museum acquired the property. He also shared with us his interest in reptiles—the Horned Toad (Iguanidi) which has a peculiarity of being able to shoot a stream of red blood six feet from a sinus near its eye— using a sphincter muscle in a vein in the back of its neck. He also spoke about the Spade Foot Toad which lives ten inches under the soil and emerges for only one night a year to breed.

Dr. Neil Snyder reported on his research on the reintroduction of the Thick Billed Parrot to the South West. Two other friends Dr. and Mrs. Brown from SUNY Albany, reported on their 20 years of research on the socialization of the Mexican Jay in the area.



Peccary.

After dark the rare black-masked racoon-like Coati-Mundi and the Peccaries (wild pigs) invaded the compost heap conveniently placed outside the kitchen window where the animals could be safely observed. Outside the nearby fence a few emaciated cattle were foraging along the stream for the scant ground cover.

Federal Land Practice allows the cattle owners to simply turn their animals out on the Federal land where they roam about eating anything they can find that is edible. This practice appeared to be not only a tough if not inhumane existence for the cattle, but in addition, it was undoubtedly affecting the natural ecology of the region.

The early morning light found many

of our group already out on the lawn with binocs and camera observing the many hummingbirds arriving at the feeders. Of the thirteen varieties found in the area we saw the Rufous, Blue Throated, Black Chinned, Broad-tailed and Rivoli's.

After breakfast, there was an invitation to visit a nearby bird-feeding station on the Ranch of Sally Hoyt Spofford (retired from the Laboratory of Ornithology at Cornell University) where we had an intimate look at the activities of several hummingbirds, Gambel's Acorn Woodpeckers, and the comical Roadrunner.

That afternoon, hearing that the rarely seen Trogan had been spotted down in the South Fork of Cave Creek, the birders hurried off expectantly on the first of several expeditions in search of this elusive pair. On each trip we met people who had indeed seen the Trogan. Three days later we finally had the excitement of a successful sighting of both the male and female Trogans. The geranium-red belly of the male Trogan stood out starkly as the bird paused briefly in the overhead trees.

During the week Louis Ritsema, who avidly pursued every opportunity to observe birds, sighted 61 species.

Perhaps the most spectacular plant in the area was the Squaw Root. Growing from the roots of oak trees, clumps of these hardy parasites, with their overlapping scales, resembled fleshy yellow pine cones.

The next day, Alden Hayes, a retired archeologist from Coronado National Park, led a sixty mile auto trip to the Fort Bowie National Historic Site. We were briefed at his home which is located across a meadow from the spectacular Silver Peak. There in his yard and later throughout the trip, Alden identified a myriad of native plants and described some of the many uses the Native Americans had found for them. For example, the Agave or Spanish Bayonette was used as a staple prepared by chopping out the large heads, roasting them for twenty-four hours in an underground pit, and then eating them hot or drying them in sheets for storage. Ground meal was made from several different species including Desert Sumac, the beans of the Mesquite, and seeds of the Pinoli. The "Squaw Bush" provided fibers for weaving.

The Fort Bowie Ruin is a National Historic Site which can be reached only by hiking a mile and a half foot trail that begins midway in Apache Pass. Because the spring located here was the only unfailing source of water, Apache Pass became an essential site to a long procession of Indians, emigrants, prospectors, and soldiers. To an environmentalist, a visit to this tiny, insignificant-looking spring that is the focus of so much history teaches an interesting lesson in the importance of water in the affairs of humans. This hilly area which lies in the Upper Sonora Zone (3500-7000 ft.) supports many species of birds and reptiles as well as a population of fox, coyote, bobcat, mountain lion, and peccary.

We learned from Alden that the Chiricahua Apaches were both hunters and gatherers of wild foods, and that they were descended from the original Apache people of Northern Canada, along the MacKenzie River. They migrated southward and probably settled here in the 16th century. They raided neighboring people, and after obtaining horses from the Spaniards, learned guerrilla warfare to protect themselves from outsiders.

Early the next morning, we packed our lunch, binocs, notebooks, and cameras and headed up Pinery Canyon for the Chiricahua National Monument. Our vehicles climbed from the foothills of the Upper Sonoran Zone (3500-7000 ft.) with its Pinyon, Juniper and Oaks, through the Transition Zone (7000-8000 ft.) with great black Ponderosa Pines and later into the Canadian Zone (8000-10,000 ft.) at Rustler Park (8,400 ft.) with Douglas Fir and Aspen, as well as Ponderosa. We could observe the changing communities of plants, birds, mammals and insects that maintain their own biological balance according to the unique climatic conditions (especially rainfall) in each life zone. Chiricahua Peak, seen far above at 9800 feet, would be in the Hudsonian Zone with alpine fir and spruce. Along the way, we saw steep banks of lovely lupine and other wild flowers, as well as Apache Fox Squirrel, an occasional deer, and several Stellar and Mexican Jays.

The Highlight of the day was the experience of sitting on top of a mountain lookout surrounded by mile after mile of weird rock formations – a

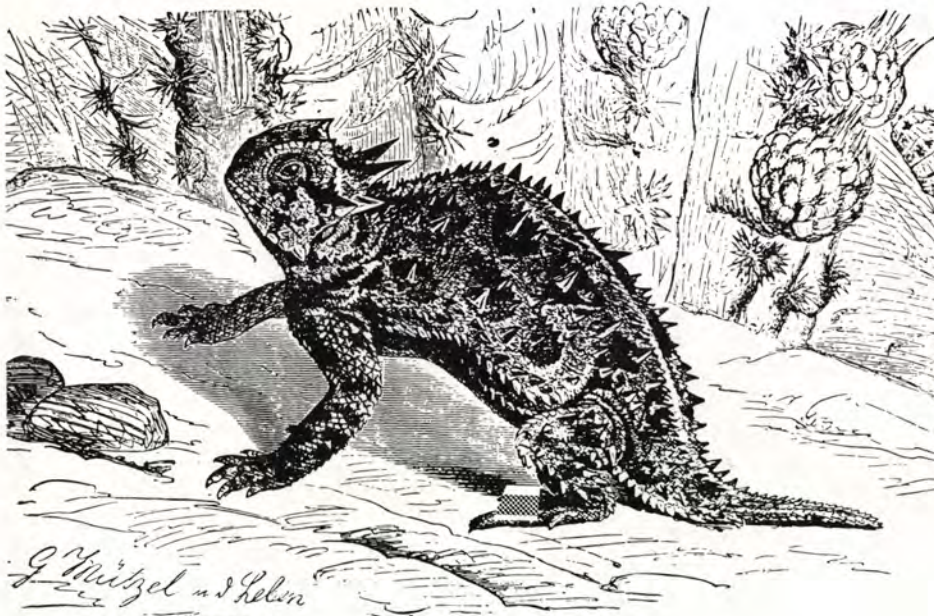
natural exhibiton of the complicated geologic history of the region. The rock story involves three major periods of volcanic activity resulting in the formation of a huge caldera. Ryolite ash covered a 700 square mile area and flowed ten miles north of the caldera where it was exposed in the area of the monument and sculpted by the elements into the unique shapes which we were observing. The small museum at this site explains about the "glowing clouds" or "Nuee Ardente" a volcanic ash which settled down in this area forming a hard welded Tuff, the remnants of which are only found at this location.

One of the highlights and "special moments" of our week was a night-time field trip with Bob Morse, a local birder. Walking as quietly as possible through the rapidly darkening woods, we crept up to an old tree and waited. Soon, we saw a movement. Bob aimed his flashlight high in the tree and caught the reflection of two tiny eyes peering from a hole, just as a second bird swooped in with food. We were looking at the smallest owl in North America, the Elf Owl. (Peterson calls this owl "the size of a chunky sparrow.") The quiet excitement of a dozen eastern birdwatchers was almost palpable as we watched this domestic scene. Later that night we were to catch a glimpse of a Flamulated Owl and a Pygmy Owl, both of which are uncommon to the area. We also heard the screech of the Whiskered Owl several times but could not sight it.

On the return trip to Tucson, some people stopped in Bisbee to tour the Copper Mines while those in the second van dallied in the grasslands looking for a reported Bald Eagle. We sighted no Eagles but added a Horned Lark, Loggerhead Shrike, Swainson's Hawk and some Ravens to our bird list.

"Spring in Arizona" – surely there could be no better way to experience the environment of the Southwest than to travel with American Nature Study Society members who share the same values and enthusiasm for the natural environment and share as well their considerable knowledge and experience. □

Jean C. Smith, M.D. is retired. This article was prepared with the editorial assistance of Betty J. McKnight, former secretary of ANSS.



Horned Lizard

ence to an apple tree is a box of instant apple-oatmeal, what difference does it make that an apple orchard is becoming a subdivision? What difference does it make that yards of topsoil are lost to erosion if someone has never felt good soil between their fingers? None of it matters unless the concepts are learned with the physical body.

So this is what the children's program at Camp Joy is designed to do. We try to fill their week long visit with us with concentrated experiences of the natural world. I don't want to teach

them how to garden; I want to overwhelm them with what wonderful and delicious things can be tasted and smelled and played with that come from a garden. Later they can learn to garden. They will support environmental action because they feel deep inside their connection to the environment.

The market garden and the apprenticeship program are a very important component of the children's experience with us. Here are adult men and women who are doing hard physical work and enjoying it! The children be-

come part of the daily life of the farm. Each day they feed the animals, milk the goats and collect eggs. We expand on these daily chores with projects like raking the used hay to make compost, or making custard with the morning's milk and eggs. Each day we cook lunch together and carry the vegetable trimmings down to the pens. We work with the bees and jar honey and make candles. They help pick vegetables for Friends who come for their produce.

When a crop is ready for harvest, like the garlic in mid-July, it is an exciting occasion. With garlic, the apprentices worked with us to get the whole bed dug up quickly. Then we loaded all the garlic into a train of wheelbarrows and trundled it to the barn, the many hands making light work. (It is essential to choose projects that can be finished and to schedule hard work for the early hours of the day, changing plans if the weather turns really hot.) Then half of us went up and made pizza with lots of garlic, sweet basil and cheese, and while waiting for lunch to be ready, we made colored buttons with ribbons that proclaimed "I was there at the Camp Joy Garlic Festival." The rest stayed down at the barn and braided little bundles of garlic for everyone to take home. When the parents came to get them after such a day, these kids really knew about garlic.

We follow this same type of format for the whole week that we have the children with us. We steep them in the daily life of the farm, making sure to tailor the experiences to the individuals in each group. We learn about the garden in the most direct manner; pinching and sniffing, cooking and tasting, touching and listening. There is a high adult-to-child ratio so any time we need to shift activities or steer a few kids in a different direction than the rest of the group, it can be done easily. The magic of the garden that we share for this intense week will prepare them to get truly involved in the work they will need to do in the later stages of their lives. □

Beth Benjamin, manager and head horticulturist for Shepherd's Garden Seeds, founded Camp Joy in 1971, and managed it until 1985, after completing a two-year apprenticeship in the University of California Garden Project in Santa Cruz.



Another link in the interwoven pattern of Earth - Plants - Environment.



Feeling the good soil between our fingers is as important as reaching out and touching a friend.

What Do They Eat?



Steven D. Garber

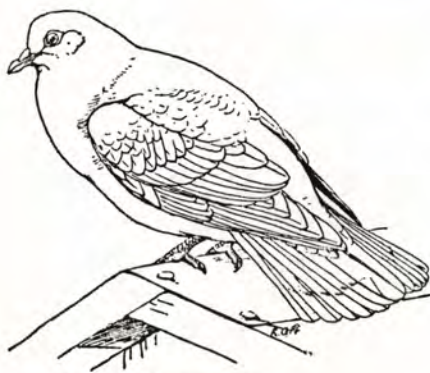
Diets of Urban Birds

Most urban birds eat foods similar to what they eat in the wild, because to them, cities are the wild. That is, if they eat seeds, in cities they eat seeds. If they eat insects, in cities they eat insects. And if they eat mice, in cities they eat mice. Some birds have changed their diets slightly, now that they have found different foods available in cities that aren't available in more rural settings, but for the most part, if the proper foods aren't available, birds can't survive in urban settings.

Below are accounts of several of the most common urban birds, complete with the foods they eat:

Pigeon

Brought to America during Colonial times, even before there were cities, pigeons used to eat just fruits, berries, grains, and nuts. Now that they live in an entirely different world, doing perfectly well in the middle of the largest cities, they have added a number of urban oddities to their diet, which now includes just about anything found on the streets and sidewalks, including pizza and shishkabob!

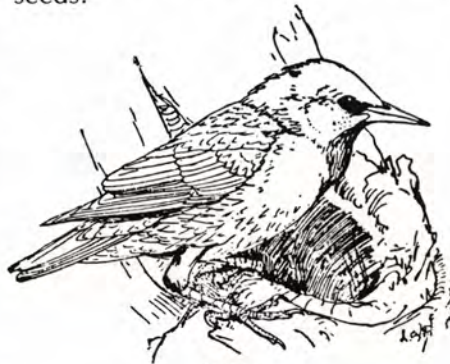


Common Pigeon

House Sparrow

Introduced to New York City from Europe in 1850, and now found in cities clear across the country, house sparrows, which are also called English sparrows, eat insects and plant material. Their favorite insects are caterpillars, as well as beetles, especially dung

beetles, June beetles, Japanese beetles, and grasshoppers. They are also commonly seen pursuing moths, bugs, and ants. They are very fond of grains, that is, just about every type of grass seed, including corn, oats, barley, wheat, and crabgrass. In addition, they eat knotweed, ragweed, goosefoot, chickweed, and sunflower seeds.



Starling

Starling

First arrived in New York City from Europe in 1890, starlings became an incredible success story, from the birds standpoint. Of course, there are many Americans who wish this animal had never been brought here, but now that it's here, it's here to stay. They eat beetles, grasshoppers, millipedes, and caterpillars, as well as a range of plant items. During the summer they feast on all kinds of berries and fruit, and then in the fall and winter they continue to eat the fruits and berries still available, such as Bradford callery pears, black cherries, sumac berries, bayberries, mulberries, elderberries, and poison ivy berries.

House Finch

House finches seem to prefer aphids and caterpillars to almost all insects. Their diets consist of small seeds, berries, and other fruit. Seeds from mustard, knotweed, pigwood, thistle, and chickweed are commonly eaten, and other grains such as corn, barley, and oats are also taken, but unlike pigeons, starlings, and house sparrows, house finches rarely come down to the ground to feed. These little birds

are commonly seen up in the trees and bushes pecking at apples and eating smaller fruits such as elderberries whole.

Redwing Blackbird

Of the native American species, this is one of the most well-known. Found in wetlands around the country, including those in urban areas, redwings arrive up north in the spring just when insects, one of their main food sources, are emerging. Their favored food items include beetles, caterpillars, grubs, grasshoppers, and ants. They also eat some snails, crustaceans, and spiders. In addition to these little animals, redwing blackbirds eat seeds, including those of ragweed, smartweed, sunflower, panic grass, timothy, rice, corn, barley, wheat, and oats. They winter in the south where they feed on grains in the fields, as well as on any available insects, before returning north the following spring.



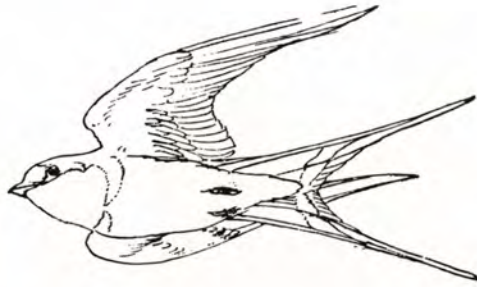
Bronzed Grackle

Common Grackle

Arriving north with the redwing blackbirds, grackles also do well in urban environments, where they are most commonly found near ponds in the parks. They eat bees, grasshoppers, and crickets, as well as spiders, myriapods, pillbugs, crayfish, earthworms, snails, baby frogs, little mice, and they'll even take an occasional bird egg. Like redwing blackbirds, they also feed on a variety of plant foods, such as those listed above.

Barn Swallow

All swallows are insectivorous, surviving almost entirely on the insects they capture in flight. The only swallow that consumes much plant material is the tree swallow, enabling it to be the first swallow to arrive up north in the spring. Swallows have to overwinter in warmer climates because, unlike woodpeckers, they can't go digging out the insects that are overwintering in protected places. The insects that swallows commonly catch while flying are beetles, flying ants, wasps, bees, flies, bugs, moths, and dragonflies.



Barn Swallow

Chickadee

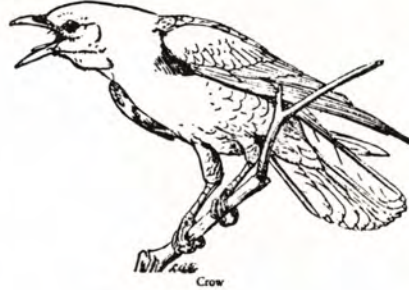
During the winter, black-capped chickadees search practically nonstop each day, for insect eggs that are scheduled to hatch in the spring, if these little birds didn't find them first. The primary types of eggs consumed are those deposited by moths, katydids, spiders, and aphids. They also go to bird feeders. During the warmer months they eat caterpillars, moths, beetles, flies, wasps, aphids, scale insects, leafhoppers, treehoppers, and spiders.

Tufted Titmouse

Like the chickadees, tufted titmice are also commonly attracted to bird feeders during the winter. However, when foraging on their own they are feverishly looking for insect eggs deposited on trees and shrubs, anywhere on the buds, twigs, branches, or bark along the trunk. During the warmer months, more than half of their diet consists of caterpillars. In addition, they also eat many scale insects, ants, beetles, wasps, and spiders.

Blue Jay

This is the common jay in eastern cities, towns, and suburbs. Blue jays primarily eat large insects such as caterpillars, grasshoppers, and beetles. When other birds are reproducing bluejays will also look for eggs and baby birds, and on occasion, they'll also gobble small mice and little frogs.



Crow

Crow

Crows eat many more insects than most people realize, which is what they are doing when seen walking on people's lawns. Their favored insects are grasshoppers, beetles, and caterpillars. They also take spiders, myriapods, bird eggs, amphibians, and reptiles. In addition, early in the morning, before the traffic picks up, they can be seen on the roads helping to clean up the previous night's road kills.



Night-hawk

Nighthawk

Nighthawks are seen and heard above most cities and town of the United States every summer evening. They eat what they catch in flight, which consists of a variety of flying insects

such as mosquitoes, moths, flying ants, flies, and grasshoppers.

Woodpecker

Several species of woodpecker commonly occur in the larger, more wooded city parks. Flickers are slightly different than most woodpeckers because they don't just feed on bark beetles and other insects by hammering away at trees, but they also hop around the ground looking for ants, ground beetles, crickets, grasshoppers, cockroaches, caterpillars, and various types of bugs. Two other common urban woodpeckers are the hairy and downy woodpeckers. These are almost identical, except for the fact that the hairy woodpecker is a little larger than the downy. Hairy woodpeckers eat beetle larvae and adults, ants, aphids, caterpillars, spiders, and millipedes. Downies also eat wood-boring beetle larvae and adults, caterpillars and moths, ants, spiders, snails, aphids, and scale insects.

Mockingbird

In spring and summer mockingbirds primarily eat insects. The preferred insects are beetles, ants, bees, wasps, and grasshoppers. During autumn and winter more than half their food is still hanging on trees, bushes, and smaller plants. The fruits taken include berries from holly, greenbrier, pokeweed, Virginia creeper, elderberry, blackberry, red cedar, black gum, grape, sumac, hackberry, mulberry, Chinaberry, bayberry, sassafras, dogwood, wild cherry, poison ivy and poison oak.

Birds of Prey

Neither hawks, falcons, nor owls make any direct use of plants in their diets. Rather, they primarily feed on birds and mammals, as well as some insects. American Kestrels eat insects, particularly grasshoppers, as well as small birds and mice, and on occasion they have been seen catching early flying bats. Redtail hawks and red shouldered hawks commonly take birds as large as pigeons, as well as mice, and some rats. Coopers hawks specialize in rats, while in cities, peregrine falcons have been observed eating mostly pigeons. □

Urban biologist Steve Garber wrote The Urban Naturalist in 1987 (Wiley).



SQUID-A NEGLECTED RESOURCE

Bernice Bunny Nadelman

Since our country has many miles of coastline, a provocative way of reaching students is teaching them about squid, a sea creature abundantly found in all the salt water of the world. In this activity, the students will use observational skills to understand the unique design of a squid and how it utilizes its various organs. Then they will cook it, eat it, and use their own creativity to recommend methods to market it.

The squid is a cephalopod, a soft-bodied organism of the mollusk phylum. It is a bullet-shaped, well-developed invertebrate with a muscular mantle (body covering) that contracts and relaxes in a jet-like fashion, propelling the animal through the water quickly and in all directions. Inside the mantle, it has a shell remnant shaped like a quill pen. It has 8 arms and 2 tentacles with suckers which catch and hold its prey, while a sharp parrot-like beak bites down. When threatened, the squid uses its defense mechanisms; jet propulsion for quick escape, camouflage of its skin color which blends with the environment and also creating a shadow image by emitting an ink cloud lasting several seconds until it escapes. The squid is highly intelligent and has eyes similar to the human eye.

Although nutritious and tasty, the squid is an under-utilized sea food. It can be purchased inexpensively, in either frozen (approx. 15 to a box) or fresh in the supermarket or fish store. Perhaps because of its weird appearance and flaccidity out of water, people are not attracted to eating it.

Procedure:

1. Before showing squid to the class, focus discussion on problems commercial fisheries have promoting under-utilized fish. Lead to the concept that there are popular, regional, over-fished preferences throughout the United States and the world.

2. What marketing problems do fisheries have when they deal with unfamiliar products? (spoilage due to lack of purchase).

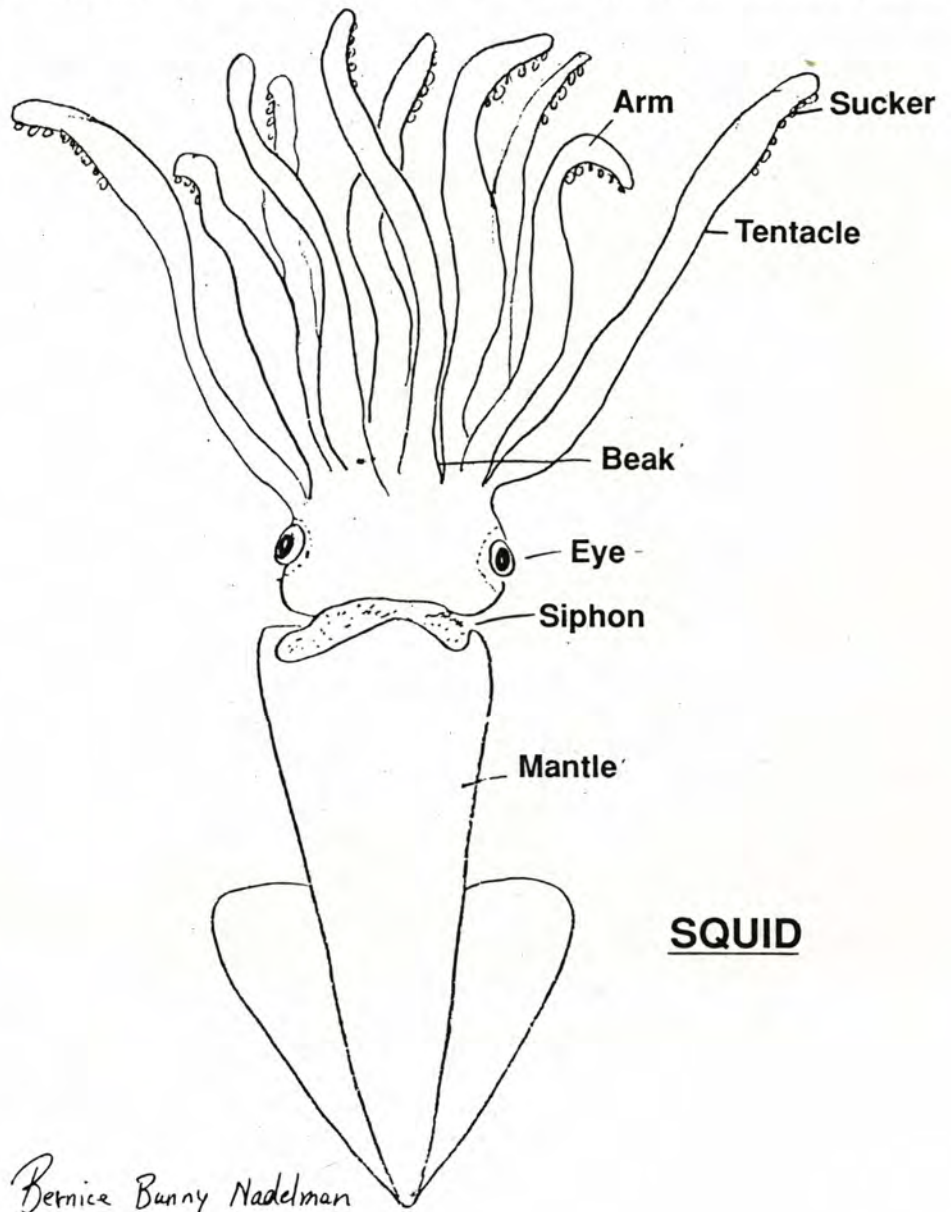
3. Show students a squid and ask if they would be tempted to eat it. (Reactions may be strongly negative. Squid is primarily used for bait in the U.S.)

4. Demonstrate how to examine the

squid. To separate, hold the body in one hand and the head in the other and pull. The viscera (digestive system) should come out of the mantle easily. If a student is having difficulty, lay the mantle flat and using scissors, cut down center of the mantle from top to tail. Spread flaps open for easy observation of internal structure.

Motivate your students by telling them the following —

“With our world population always increasing, all forms of edible protein will have to be utilized. You are marine biologists who have been researching



the problem of promoting unfamiliar species of marine life for human consumption. Examine the squid for its unique characteristics, cook it, eat it and then make recommendations in your log book on how to catch it, process it, and market it."

-Examine and appreciate the unique design and color of the squid. What is the advantage of its bullet shape?
-Are you a seafood lover? Would you like to have this creature for dinner? Write reaction and why.

The Dissection

-With scissors, carefully cut off the arms and tentacles (save for eating)
-Using a hand lens, observe the formation of the suckers. What purpose do they serve?

Draw the pattern here.

-Pinch off upper and lower beak from the mouth area located in the center of the nest of arms. What function does this hard beak serve? Draw it.

-Pinch out the lens in the eye. Feel around for a hard B-B like object very similar to the human lens. Use it to magnify the print of a newspaper.

-Hold the mantle in one hand and the head in the other and pull. The viscera should come out of the mantle.

-Observe the muscular funnel (siphon) just below the head which causes the jet propulsion. Put your fingers through it.

-Remove the translucent "pen." Does it have a function?

-Isolate the silver ink sac and carefully puncture it with the tip of the translucent pen. Write your name in squid ink. The whalers kept their diaries like this.

Cooking: Another Dimension

Wash the mantle thoroughly and cut into thin strips or rings. Along with the arms and tentacles put this into the colander for another rinsing. You are now ready to cook the squid in the electric fry pan. Only arms, tentacles and mantle strips are to be eaten. Discard the rest. Heat the sauce and spice it up according to taste. Add the squid and cook for two minutes. Do not overcook or it will become tough. As soon as the squid turns white, it is ready. You can serve with crackers or spaghetti. Be adventurous and make up your own recipes.

Discussion

-What can be done to help make this product fashionable, then popular, then traditional? Write jingles, songs, commercials, skits. Design packaging.

-Interview people after giving them a taste of squid and compare their initial reactions from "Ugh, take it away," to "yum, I want more."

-Graph the results.

-Have a squid party and invite other classes.

Draw a picture of squid in your log book. Label all the parts.

Materials Needed

For team of 2 students:

1 squid	log book
1 scissors	hand lens
1 tray or folded newspaper	

For class of 30 students

1 electric fry pan	
1 can (lb) tomato sauce or spaghetti sauce	
garlic powder	colander
oregano	wooden mixing spoon
30 paper cups (3oz.)	30 plastic forks

Bernice Bunny Nadelman is a science teacher K-6 at P.S. 178, Jamaica, Queens, NY. She is also president of the Elementary School Science Association (ESSA). □



Kitchen Biology

Lenore Miller

When we sit down to our evening meal, it's sometimes hard to realize that everything, yes, everything on our plates (except perhaps for the salt we sprinkle) was once a living organism. And that goes for all the other meals and snacks too...whatever we are eating was **ALIVE!**

The preparation of food lends itself to Kitchen Biology, in which the culinary scientists use their scientific eyes to examine the foods we eat, both plant and animal. The classroom teacher can also carry out Kitchen Biology with or without a kitchen, by being selective in the food that is used for study.

The food, however, must be prepared from "scratch" and so, to shop for such lessons, it is necessary to bypass the frozen foods and canned goods sections. Instead, head for the fresh produce, meat or dairy departments. Great specimens can also be found in the fish and seafood stores of your neighborhood. Pre-packaged foods may be a time-saver, but it's mighty hard to see the chicken that went into those little breaded nuggets!

What foods can we select that will interest and excite those who prepare and eat them? For plant study, we can choose from fruits such as apples, pears, melons. And for botanical fruits (though most people consider them vegetables because they are not sweet or dessert foods), we can choose tomatoes, peppers, squash, cucumbers, eggplants and beans. Other choices might include celery, broccoli, carrots and potatoes.

From the animal kingdom, use eggs, poultry (ducks, chickens, turkeys), fish and other seafood. It is possible to use other meats, like lamb, pork and beef. But they are more difficult to study. Because the animals are so large, we only use small fractions of them when we are preparing food; therefore, we rarely get to visualize the whole creatures that provide us with that choice steak or hamburger. Nevertheless we should discuss these with our pupils since they should realize that although a burger does not resemble a cow, it is still the flesh of the cow we are consuming.

What are some of the specific ways we can use certain foods and what can we learn from their preparation?

Plants 1. Where the flowers were (look for flower remnants at the bottom of apples or zucchinis). 2. What parts of the plants are we eating (stems, roots, seeds, flowers)? 3. What fruits and vegetables share common characteristics (they may tell us that the plants are related or in the same botanical "family")? 4. We can look for the symmetry in many fruits and perhaps wonder why it exists. Here's an example that is readily available, requires no cooking, can be consumed on the spot and everyone loves: **APPLES!** If we cut one in half around its "equator", we can observe the symmetrical, five-pointed star design of the seed chamber. We'll notice that the brown seeds are well-protected by a hard coat and are enclosed within a cuticle where they move about freely. We can ask our observers if there are always exactly five seeds, one within each pointed chamber? Use a hand lens to look closely at the chambers. Do you see other seeds that never developed fully? Look at the end of the fruit that is opposite the stem. If you look carefully and use the lens, you may be able to find the dried remnants of the apple blossom (flower). You should be able to see the sepals and perhaps the dried pistils and stamens (you may have to look at a few apples to find all of these).



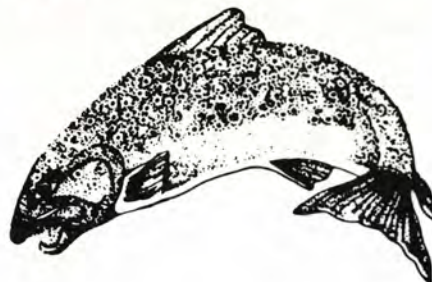
If we were learning about **Birds** and were preparing chickens, we could look at the skeletal structure, blood vessels, internal organs (heart, liver, gizzard, kidneys, lungs), the skin, feathers or what's left after the chicken has been "dressed" (wouldn't it make more sense to consider a chicken that has had its feathers plucked as being "undressed"????). We could see where the fatty deposits are found. We could examine its wings and feet. Occasionally, chickens are slaughtered

with developing eggs inside; you can ask your butcher to save these for you since they make an especially interesting study of the bird's reproductive system. Turkeys and ducks may be looked at in the same way, comparing them, noting their similarities and differences.



Fish are an excellent choice for study since you will have a complete animal to dissect. You might consider requesting that the person who sells you the fish (or perhaps you might have caught your own) not clean it for you. This way, you and your students can do all the examination you please. Cleaning and de-gutting a fish can teach a great deal about the location of various organs. Look at the head, examine the eyes and teeth (if any), open the mouth and examine any cartilage. Find the gills, look at fins, tails and anal opening. If it has a swim bladder examine this and relate a bit of physics biology. For "shellfish," look at muscles and appendages: this is especially good for creatures like lobsters or shrimp.

The larger animals present a bit more of a problem, since it becomes difficult to visualize the whole animals. You cannot discern from what part of the cow that steak was cut. Leg of lamb, or rib chops are a bit easier. I would not recommend any of these larger animals for any classroom study, but that does not mean you could not do it on your own or within the context of your own family. I did do a successful lesson using cows' eyes (obtained from the local college) with the 6th grade gifted class. I do believe the students learned more about vision from that lesson (and so did I!) than from any book.



Vegetarians may have difficulty with any examination of animals. They can limit their lessons to the examinations of plants. However, youngsters do need to know about their source of food, be it plant OR animal. In fact, I would suggest that because our animal foods do **NOT** resemble the creatures who provided the food, fewer people adopt a vegetarian lifestyle. Many of my non-meat eating acquaintances have informed me that their conversion to a vegetarian diet was prompted by the realization that meat was indeed animal flesh. Until that realization was brought home by direct experience, they saw meat as far-removed from its source.

The intent of this article is not to present an opinion on the above issue. However, I do have strong feelings about not wasting **any** food. Therefore, whatever food you are planning to utilize in Kitchen Biology should be consumed, preferably by the participants. This should be kept in mind when you are deciding what foods you will use for your studies. Incorporate the food into a snack or lunch dish (a salad of tomatoes and cucumbers perhaps) or an after-lunch treat (make applesauce or pumpkin bread). Try the squid dissection on page 17. Then, cook up the squid for a class lunch and serve over spaghetti for a special treat.

The bounty of nature and the Earth can be endless, yet vulnerable and pre-



cious. We owe a deep debt of gratitude to all the living organisms that share the planet with us, for without them, we would die.

Note: Reprints of news articles by the author give detailed instructions plus additional information on the following topics: Apples, Pumpkins, Pods, Eggs, and Turkey, and may be ordered by mail from:

Lenore Miller
296 Arlene Street
Staten Island, NY 10314



Good Reading



THE HEART OF THE VALLEY by Nigel Hinton. Harper & Row, 1986.

How does one turn natural history and the relationships between animals or animals and humans into a best seller or box office hit? Perhaps through the interaction between various animals given human voice, attitude and attributes as in the *Wind In The Willows*. Or the communication between one child and the barn yard animals of *Charlotte's Web*. More appealing to our present day, the color and sound of *Bambi* or *Land Before Time*. In all these, animals are given too much humanity.

In the *Heart of the Valley*, Nigel Hinton weaves a story that involves a rather unlikely Hedge Sparrow or Dunnock, a Cuckoo, and the human residents of the English countryside. But unlike so many other works, the events in the day-to-day routine of the human characters are presented to reinforce the events in the lives of the animal characters, or as events impacting the animals' lives. These events are not always realized by the humans as when a small bird reacts to an oncoming car, only to be overpowered by the monster it tried to avoid. Other events so common to humans bring about changes in the lives of the animals that are for good and ill.

As for the Dunnock and the Cuckoo, the author provides a narrative that relies solely on his power of description. There is no human dialogue, nor any unnatural verbal debates between the animal characters. The Dunnock, the Cuckoo and other animals live what appear to be "natural lives" but are made to seem, as they indeed are, unique and wonderful as the drama and magic of Spring unfold.

In this beautifully written story the author shows connections where none seem apparent. Connections between the events in the lives of people and animals that are often overlooked by the former in the hurried attempt to carry out their day-to-day activities. And despite the routine nature of the events described, their impact is often unpredictable and unexpected. This

reader at times became so involved as to become "angry" for events being allowed to unfold as they did whether in the lives of the animal or human characters.

But, as the book closes the honesty and accuracy of the events described seems to become more clear. The degree to which we as humans often ignore or fail to see the magic and drama in the natural events that surround us is all too prevalent in our society. After reading this work one is compelled to view the natural world with a new understanding and awareness of what is happening and how our routine actions may result in dramatic changes in the lives of the fellow occupants in *The Heart of the Valley*.

Arthur Currence, Naturalist
Buckhannon, WV

LAND AND RESOURCE PLANNING IN THE NATIONAL FORESTS by Charles F. Wilkinson & H. Michael Anderson with Foreword by Dr. Arnold W. Bolle ISLAND PRESS, P.O. Box 7, Covelo, CA 95428 & Washington, DC. 1987

Forty-eight years ago I worked proudly, albeit briefly, for the U.S. Forest Service, and since then have watched with interest how it has managed and mismanaged our National Forests. Now this scholarly legal review of the history of the Service from its beginnings in 1876 gives in 396 solid, well-footnoted pages the background of the planning which has been basic to today's questionable policies.

Planning implies knowing what one wants for the future. More and more Timber? Wilderness? Something else: Range, Water, Minerals, Wildlife, Recreation? This book presents a long, authoritative chapter on the past and present of each use, as prelude to

THE SIERRA NEVADA - A Mountain Journey by Tim Palmer. Island Press, Washington, DC & Covelo, CA, 1988. 6 x 9" Paperbound, 248 pages, Black & White Photographs, A Sierra Nevada Almanac, Sources and Index.

People have written hundreds of books about mountains they have grown to love. This one is superlative like the heights it celebrates. Tim Palmer loved the Sierra Nevada before he undertook writing this book. I sensed that from the first page where I began my reading-journey with him in a spring snowstorm at the end of the plowed section of the Ebbetts Pass road - Highway 4. Now having accompanied him via every page along his roads and trails and pathless wilderness, I too have come to love this 400-mile upthrust of Planet Earth.

Tim (I know him personally only from his pages and little jacket-cover photo) writes with knowledge and grace. His abundant facts have been carefully researched; his sensitive feelings have come from intimate experiences with the rock basement and sky

what will be done in the near and more distant future. As students of nature and our reciprocity with it, we must be concerned. Since the National Forest Management Act of Congress in 1976, many of us have been involved in citizen monitoring and influencing National Forest Plans, with some beneficial results in developing them. But from our point of view, timbering and roadbuilding are still overbalancing concern for proper care of soil, water, and forest ambience. We must do better.

As naturalists helping people to study nature, we can urge them to follow the wise attempts of the U.S. Forest Service to use Spotted Owls as indicators of old-growth forests in the Pacific Northwest. (See Chapter 7.) We can note the environmental destruction of some roadbuilding and clear-cutting. (See Chapter 4.) All chapters have tables of contents for easy reference and study. Let us use them.

John W. Brainerd

ceiling and nature's bounties between them. Nature-oriented people who do not know the Sierra are in for a treat with this book; and those already familiar with its peaks and rivers, plants and wildlife, will also learn enjoyably from Tim's experiences so lucidly set forth.

This book exemplifies the best of modern conservational writing. Along with the natural history, we find abundant human history. On the trail and in the Sierra Villages, Tim introduces us to many of the people who have helped make that history in recent decades, who have saved wild rivers and stands of vegetation, who have journeyed often to the State House and to Washington; and we read many quotations from people who typify those stressing the importance of personal short-term gain from our natural resources. Genuine people all, but Tim's hopes for the future of the Sierra in a state and nation with growing population pressures are clearly based on the former kinds of folk.

This is not a text. The mountains are. Tim's book is an invitation to study them, for their good and for our good.

(We should also applaud ISLAND PRESS, a non-profit outfit which makes available timely books on conservation.)

John W. Brainerd

Food First Curriculum. An Integrated Curriculum for Grade 6

Laurie Rubin. Institute for Food Development Policy. 1885 Mission Street, San Francisco, CA 94105. 1984. 146 pp (unbound)

A very useful, detailed guide for teachers as they help children learn the paths of the food they eat, the roots of hunger here and abroad and how they can act locally on these global problems. The book points out the many parallels between the causes of hunger in the Third World and our own food and agricultural problems. The Food First Curriculum provides opportunity for children to learn "where their food comes from, how it gets to them and who gets bypassed." The material responds to the needs of children "to develop skills for working for democratic changes, their need to communicate with other people, to analyze situations, to solve problems cooperatively and to organize workloads." The material is organized around 6 units; Unit 1. Why do people around the world do things in so many different ways? Unit 2. Where does our food come from? Unit 3. How do we get our food? Unit 4. Why are people hungry? Unit 5. Who's hungry in the USA? Unit 6. What can we do?

While the material is basically in-

tended for sixth grade the First Food Curriculum has been used successfully in both grades 4 and 5. The objectives indicated are also appropriate for these earlier grades. The Curriculum description presents the material to be covered in detail as well as many suggestions for developing it with children. It includes Goals, Key Ideas, and Activities, and especially important, the related activities in science, social studies, language arts, nutrition, geography and many other areas of the curriculum.

The curriculum Guide contains details for the use of the material including Background Reading for the Teacher, a Pretest and Post-test, specific activities and detailed directions for using them. There are also "Questions for Discussion," "Action Ideas" and "Lists of Needed Materials." There is considerable originality in designing these activities and they should be especially useful to inexperienced teachers. At the end of the Guide there is a very helpful Resource Guide that includes books about teaching at various levels, games, records, audio visuals, posters, catalogues, and resource lists.

Glenn O. Blough
Professor Emeritus
University of Maryland

LAST STAND OF THE RED SPRUCE, by Robert A. Mello. Island Press, Box 7, Covelo, CA 95428 & Washington, DC. 1988. \$14.95. Published in cooperation with Natural Resources Defense Council. 208 pages, photos, charts, graphs, chronological appendices, endnotes, bibliography, index.

Outside my window hillsides are clothed with Red Spruces. The tallest fringe the ridgetop against the gray sky. By the bone-dry road, tall spruces stand above a dark puddle made by drippings which the branches above have combed from fog blowing in from the Gulf of Maine. I fear for the future of these tree companions of many years. They breathe and are

washed by dirty air. Will my children have to say goodbye to them because of people's uncaring use of Planet Earth?

Sentiment aside, no one of us can afford to let air pollution and acid deposition continue to despoil the natural world which supports us in all we do and all we are. We must bring to the attention of politically active people, our friends, colleagues, and officials in industry and government, the data and conclusions ably presented by Robert Mello in THE LAST STAND OF THE RED SPRUCE. Buy it. Give it.

Attorney Mello took a year away from his law firm in Vermont to seek out the work of many scientists who

have struggled with the complexities of the forest ecosystems supporting Red Spruce and associated species, the sugar maples, balsam firs, white birches, mosses, lichens, and soil microflora, and also the atoms and ions of air and water making their lives possible or impossible. His story is a prime exposition of how scientists work – and how some misguided and/or greedy people have chosen to disregard the conclusions to be reached from the research. Mello presents a readable, scholarly, and cogent case for so-long-overdue political action for **enforcement** of the 1955 Clean Air Act.

John W. Brainerd

Environmental Literacy

continued from page 9

the stiff, gossamer flying structures of an adult, is an experience to remember. Once one has experienced the cycle in a personal sort of way, it would be difficult, I think, to desecrate a waterway in which dragonflies complete a life cycle.

Another organism worth keeping is the common American Toad, *Bufo americanus*. The eggs are easy to collect, the tadpole easy to feed, the metamorphosis rapid, and the adult at home in most yards, gardens, or woods of the Northeast.

There are many others that biologists and ecologists could suggest. The particular species is not so important as it is for the student to care for, observe, record, and be responsible for, an organism. When the needs of an organism are tended personally, something happens by way of environmental sensitivity — something important to environmental literacy. A sympathy, an appreciation, an increased dedication to environmental quality.

Then there is another, more tenuous, yet extremely important facet of environmental literacy. That is valuing. So long as our students place more value on rock concerts than on rocks; on throw-away fads than on maintenance of equipment; on "chuck it" than on "check it," environmental literacy is in a bad way. One of the most important efforts we can put forth is to change the tendency of students, regardless of their "knowledge," to place proper environmental values on both things and actions. If students can find value in supporting divestment in South Africa, if they apply value to activist roles in support of either right to life or free choice, then certainly we can find the means of their valuing environmental quality and environmentally responsible practices and policies. When students internalize values, they will evince environmentally sound behaviors.

How can environmental literacy be accomplished in a conscious, organized way? Not by a course. Not by decree. But by sustained, campus-wide, overt introduction of small but real environmental examples, ana-

logies, problems in courses, and the intentional relating of coursework to the personal lives of the students. When education has environmental relevance for students, when students become convinced of the consequences of their actions, when they value what they are in danger of losing, then environmental literacy may be realized. □

Better People

continued from page 6

the building. The building has many windows which allow passive participation in the environment. Resident behavior and attitude towards daily living is significantly affected by the physical environment.

Horticultural therapy is thus both an active and passive therapy. It is utilized with both the old and young, with a myriad of capabilities and life situations. Its emphasis can be directed towards specific client goals as well as



to improve the overall environment. The fruits of this therapy nurture the body, mind, and spirit.

For more information about horticultural therapy, contact:

The American Horticultural
Therapy Association
9220 Wightman Road, Suite 300
Gaithersburg, MD 20879
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Karen L. Smith, HTR, is horticultural therapist at the Holden Arboretum, Mentor, OH

John Gustafson, ANSS Treasurer, and Dorothy Wade at the dedication of the bench in memory of Douglas Wade, former president of ANSS, at the Lorado Taft Field Campus at Oregon, IL. Doug served on the faculty at Taft for many years. The bench overlooks the "show prairie" on the bluff of the Rock River. Doug and Dot devoted much of their life together to prairie preservation and restoration.

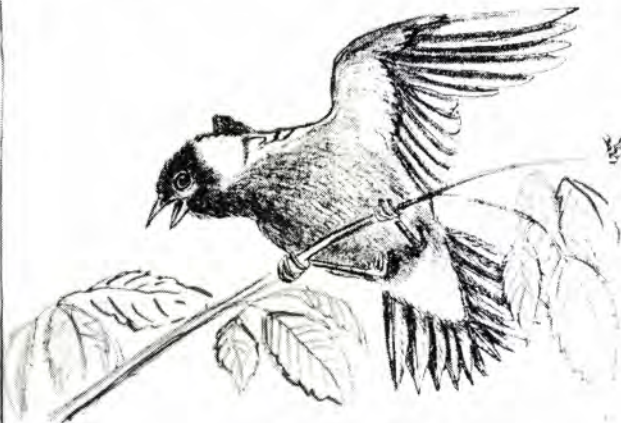


Naturalist's Notebook

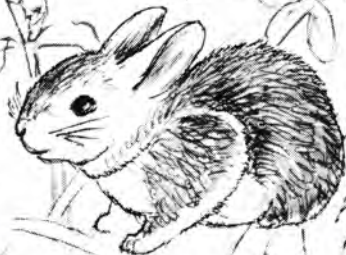
Back Pasture of an
Old Pennsylvania Farm



... furnishes food, shelter
and living space for
a diverse community
of living things—
provided that the
land is left uncleared,
unpolluted, and
is free of poisons
and pesticides.



What communities
can you find in your
back pasture, your
backyard, or the
nearest vacant lot?



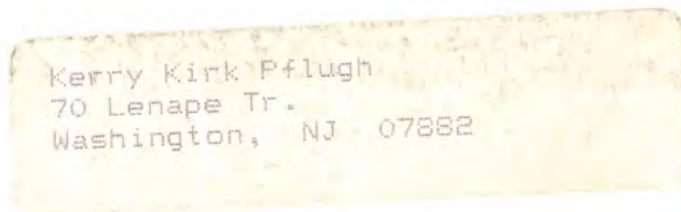
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