

Nature Study

A JOURNAL OF ENVIRONMENTAL EDUCATION AND INTERPRETATION



Winter, 1972-1973

Volume 26, No. 4



PHOTO BY DOUG DANCKS

Putting It All Together

— The American Nature Study Society —

Putting It All Together

As a member of New York's Temporary Commission on environmental education, I have been involved in a number of regional meetings around the State. Perhaps the one most important impact on my thinking to emerge from these encounters is the realization that there is a tremendous reserve of interest and talent, of expertise and imagination, to be tapped for environmental education. What is needed desperately is some means to "put it all together."

The fact that Man has been busy taking the world apart for centuries is reflected in the kinds of governmental and societal organizations he has created. They persist in a kind of narrow parochialism, each concerned with some aspect of the use (or abuse) of the environment — each still working to take the world apart even more for the benefit of whatever clientele it may serve. This is no less true of state departments of education and conservation than it is of labor or agriculture. This is not to say that these established organizations do not serve a useful or necessary function. But their input to environmental education is biased and incomplete.

In New York we have come to the conclusion that we need a vehicle by which these many agencies and organizations, governmental and private, can be brought together in a coordinated environmental education effort. We need someone at the State level who can "ride herd" on state agencies to work together in environmental education activity. We need someone at the regional and local levels who can bring together the many organizations and individuals who have something to offer — or who SHOULD have something to offer — for environmental education.

Environmental education, like the environment itself, is "all-of-one-piece" education. It MUST be interdisciplinary. It MUST cut across the departmental lines we have drawn in education and environmental management. It must permeate EVERY level of society, reach EVERY person of whatever age or status. It must be the kind of education which moves people from KNOWING to ACTING. It must "put it all together."

J.A.G.

TIPS for Environmental Education and Interpretation . . .

Nature Under Ice: Surprises and Sensitivities At A Winter Lake

ROBERT A. BONAZZI

Science Department, Cazenovia Central School, Cazenovia, New York

When the snow begins to fly and days become short and bitterly cold, many of us who deal in environmental education move indoors. Most terrestrial organisms which are not dormant or inactive can barely subsist, and should the winter be particularly harsh or long, many will not survive to feel the freshness of spring breezes. Inspection of our icebound aquatic habitats presents an even more hostile arena. In even the largest lakes, which remain ice free, the winter fresh water ecosystem appears lifeless. Lakes take on the specter of a desolate, windswept desert, inhospitable to all living organisms. And yet, we wonder at what is going on beneath the ice. Where are the organisms of the lake, so obvious in the warmer months?

As we chip through the rock-hard ice to reach liquid below, we are in for some startling surprises about the ecosystem under our feet. That the solid ice floats on the liquid water is itself a provocative point for discussion! When we poke our nets and dredges below, we will reap some unexpected finds and learn of secrets and excitements in a winter lake not usually encountered, or even imagined.

By leaving the outdoors for the shelter of our classrooms, we overlook some of the most beguiling and exciting experiences nature can provide. Trips to winter lakes can furnish those of us who work in environmental education with unique insights with which to motivate our students. It has been my experience that a winter sortie to a frozen lake is a stimulating experience for both student and teacher. I find that each trip somehow yields a variety of revelations about the ecology and biology of the aquatic ecosystem. One is virtually assured of discovering something different on every outing.

Yet, there is more to winter outdoor studies than the purely scientific considerations. As we well know, in order to succeed at educating young people about nature, our programs must "motivate people to live eco-logically in the environment."¹ Put another way, we must "internalize" that which is externally obvious. One of the prime objectives of our environmental experiences should be to "sensitize" students to the natural phenomena which supports and sustains them. "Experiencing nature" on a frigid afternoon sampling a frozen lake can help us reach this objective and take ecologic studies past the intellect and into the spirit.

In the following paragraphs I will relate an environmental experience in which I engaged students at Cazenovia High School in sampling at nearby Cazenovia Lake. Initially it was a major part of a senior aquatic ecology course,² used to generate interest and commitment to our ecologic studies. It has since been used in other grades as well.

Some Thoughts

Beginning in January, as soon as the ice is safe, students begin weekly trips onto the frozen lake surface. The purpose is to observe seasonal variations in the lake ecosystem. Since these trips are taken regardless of weather, it is not uncommon to encounter intense cold, piercing winds, or even a snowstorm. Because it is part of the class's overall study of the lake, students realize that samplings must be done even in the most inclement weather. Almost without exception, the students accept the role of "scientists" trying to answer pertinent questions.* In fact, though we make trips in the mild and lovely spring months, the greatest excitement and enjoyment is generated during the most adverse winter conditions. Students gain the perspective of the professional scientist and what he must do to understand natural phenomena. When they return with that precious vial of plankton or bag of sediment, they live the joys and the frustrations encountered in learning about nature. They are involved both mentally and physically, and the experience becomes a lasting personal one.

On these trips I often step back and just watch. It is fascinating to see a class of high school kids become a "scientific research team," helping one another and thereby learning. Like all of us, students enjoy an adventure. They feel good about being able to perform appointed tasks under harsh and trying conditions . . . and know they can do a good job. In the most adverse weather, their spirits are always high as they enthusiastically stride out onto the windswept ice.

Almost everyone agrees that the ocean, a forest, or a lake is a beautiful thing to see, but there are few who actually "feel" the beauty of nature. That is why we can admire nature in one breath and despoil it in another. Providing experiences which help students to "feel" nature, can "internalize" the harmony and serenity of natural systems. Just taking students on frozen lakes does not, of course, "sensitize" them to nature, but perhaps it can help. Anyway, it seems to work.

The Trip

Each trip to the lake is a scientific "expedition." We attempt to ask (and answer) specific questions. It is important to have an organized plan as to what is to be sampled, where sampling is to take place, and who will be responsible for what data. To facilitate this organization, a "Head Recorder"

* It is important before the trips to have students generate questions which the trip is designed to answer. The trip is then a scientific expedition with a purpose.



Students "stand-by" as we chop through the ice.

is selected for each trip. This person, a different one each time, must assign jobs, account for data, and direct all research activity. He is, then, the trip leader and director.

The other students are assigned to the collection of specific data. Water chemists analyze for oxygen, carbon dioxide, and pH, as well as nitrates and phosphates on occasion. The Secchi disk depth and a temperature profile are also taken.

Using a hand pump, calibrated to liters/pump, other students collect plankton. About 20 l. of water (sometimes more as conditions warrant) is concentrated into a 50 ml vial and immediately preserved. Later, this may be used to assess phytoplankton and zooplankton density and diversity.

A simple dredge is used for collecting benthic flora and fauna. Samples are placed in plastic bags and sorted later. Like the plankton, they may be preserved and used later for project studies or in-class activities.

While sampling is in progress, the head recorder takes data on other environmental observations, cloud cover, air temperature, wind speed and direction, and other factors. All this information is placed on data sheets (along with other students' data) and stored for future use. This information may be retrieved later and used for reports.

At each collection point, it is necessary to chop an opening large enough for our equipment. This is accomplished using an ax and pick.* The openings are carefully marked so as not to be a hazard to others using the lake.

Back at the lab, students look at the day's haul. While sipping their coffee or cocoa, they begin to analyze the vials and bags of samples. The head recorder (still in charge) checks the data sheet and verifies it for accuracy. After the brisk outing, the students enjoy the warm informality of the lab. Soon someone finds something new or strange or startling . . . then the whole place is alive with the delightful bustle of busy, interested people.

Findings

The samples, procured at the minimal expense of cold feet and icy cheeks, always yields something of interest. I myself do not know what might be found, and students seem to like that . . . we are discovering together . . . I don't have all the answers . . . for a change.

On one trip in mid-March, we obtained some interesting

* Which are cheaper and more readily available than the boats, motors, anchors, life preservers and red-tape necessary to collect the same data in the warmer seasons of the year.

physical data. After chopping through two feet of ice, the following temperature profile was obtained:

Surface	- 1.5°C
1 meter	- 2.0°C
2 meters	- 2.5°C
3 meters	- 3.0°C
4 meters	- 4.0°C

One student commented, "Mr. B., we made a mistake . . . we got warmer water at the bottom of the lake." After convincing him to trust his instruments, the discussion which followed led to the students' understanding of one of water's unusual qualities - it is most dense (and therefore heavier per volume) at 4°C and sinks below colder water.*

Another interesting result was noted when samples of Ceratophyllum, Elodea, and Myriophyllum were obtained in the dredge sample. Samples were taken in shallow water of about 2 meters under heavy ice cover. These plants appeared viable and their deep green color indicated photosynthetic activity. Among this vegetation, many species of active animals were observed. Cladocera and Copepods were common. On one trip we collected macrophytes which contained a multitude of amphipods which appeared to be mating. Using "Fresh Water Invertebrates of the United States"³ students discovered that they were indeed mating, or rather, they were involved in pairing, which precedes actual copulation. According to the literature, they remain paired for from one to seven days, feeding together. The pair then separates, the female loses her exoskeleton and they pair again and the transfer of sperm occurs.

Plankton collections also yielded results which were unexpected but delightful. Under about 60cm of ice, students discovered high densities of *Daphnia* s.p., though the water temperature was about 2°C. Another common, and abundant, organism was the nauplii larva (characteristic first larval stage of crustaceans in general).

Other finds under the ice were Hydrocarina (water mites), insect larvae of all kinds, ostracods, planaria, and Pisidium (Pelecypods).

Obviously, what is collected will vary from lake to lake, according to its size and winter conditions. One thing is sure, however; every trip will be different and every sample filled with something to interest and fascinate your students. Simple

* Were it not for this quality, it is highly unlikely that life as we know it would exist. Lakes and oceans would freeze from the bottom up, precluding any continuity of aquatic life.



Plankton is collected using a pump (see student at lower left) and a plankton net.



Students ready homemade Secchi disks.

pictorial keys will help in identifying unknown organisms and give students the information necessary for their studies. Equipment is inexpensive and can be fashioned if needed.

Scientific inquiry and sensitivity: both play a role in "internalizing" what ecology is about and the beauty of things natural. When we bring students into contact with ecologic phenomena, we must also develop attitudes which will generate genuine commitment and concern for the environment. Experiences which encourage personal action and involvement will help in this end.

References Cited

1. Gustafson, John A. 1971-72. Field Trips For Feelings. *Nature Study*. 25:4.
2. Bonazzi, Robert A. 1972. The Aquatic Ecosystem: A Continuing Study. *The American Biology Teacher*. 34:5.
3. Pennak, Robert W. 1953. Fresh Water Invertebrates of the United States. Ronald Press.

ANIMALS — Some Alive Today, Some Dead

by JOYCE KANTOR

Jenny and I are outdoors. She comes toward me, tossing high in the air a long dark rounded object, bats it near me, sniffs once, turns from it in disgust.

I touch the mouse, pick him up. He is yet warm and soft as I had known he would be; later my cat would not touch him. His mouth is just open, teeth yellow; his bare pink paws lie straight back along his body, pointing toward his head. One eye is half closed and filmy. The other is wide and so bright and expressive that I look more closely to be sure he is not living. I lay him on the grass and place one finger gently on his chest to feel if he breathes. He does not.

Now that he is dead, I am pleased, feel no pity as I would if he were running in that unequal race, panting, eyes bright with terror. Jenny is pleased and proud. What she has done is the essence of cat-ness, the end of all the waiting, the stalking, the leaping.

I drive to the store, slowing for a dark object in the road, seeing as I come closer that it is a dead woodchuck. But now I see it moves its legs and the chest rises and falls. There is blood visible in the ear which shows as it lies on its side.

I stop the car and consider what to do. I would like to move it from the road but am afraid of being bitten, and I do not want to cause it pain or fear. While I think, watching its chest, thinking any moment to see the breathing stop, a car comes behind me. I rapidly move on so that the driver will not pass me on the left where the woodchuck lies.

At the store I feel sad, sickened and frightened. I hope that someone else will hit and kill the woodchuck before I pass again. I hope it will already have died.

As I approach the animal and pull to the side, I see his legs move, a stronger motion than before. When I close the car door, he moves his head and front paws, probably in fear. Perhaps he will live; then I must move him. Will he bite me? Will I cause him pain or panic?

I come closer and see that his mouth is stained with blood. I see blood around the protruding teeth, as

well as in the ear. The eye which I can see appears dimmed but he focuses it on me as I bend over him. And his breathing is regular.

I stop and speak to him, stroke his back, ask him not to bite me and, placing my hands under him, lift him to the grass beyond the road. I move the grass away from his nose. Tomorrow I shall see if he is gone. As I get into the car, I think sadly that if you are a woodchuck it is probably better to be dying in the grass.

Woodchucks. I immediately visualize half a dozen of the many I've seen dead by the roadside. I remember the farmer's legendary hatred of them, the bodies I've seen tossed over barbed wire fencing. I think of Henry Thoreau. I think of the man I know in Vermont who refuses to shoot his woodchucks, instead patiently flagging their holes each spring for the guidance of horses and riders. I remember planning my garden in the field, being told it would inevitably be eaten by woodchucks, wondering if I might learn to shoot them.

With all of this, then, in what way am I linked with this animal I have found? In what way obligated to him, to action for him? I see two things. First, that the start of his dying is alien, a thing of steel and asphalt and impersonality; it is not even so much a part of nature as a boy with a gun. Second, he remains alive. The rib cage lifts and falls; the eyes move; the legs try to run. Is it a matter of my identifying with his pain, then, or only a matter of support and care for whatever lives? Thinking gives no reply.

On the following day I stop by the roadside. I find the place where I left him, grasses matted, dandelion stems broken and flattened. I had placed him some two feet from the road. In the intervening area is the same flattened look; he has left this place — alive.

Later in the day, out in the strong wind hanging clothes, I think of him. I see him running, fat and furry, through a field of waving grass, stopping to rise to his hind legs and look about. As he sits with his nose pointed into the wind, he is the essence of woodchuck-ness, and I smile for pure joy.

"putting it all together" at an inner-city high school . . .

A Three Year Water Pollution Study By Douglass High School Students

JESSIE M. PERKINS

Biology teacher, Douglass High School, Baltimore, Maryland

Douglass High School of Baltimore, Maryland is an inner-city high school of around 2000 students.

Our interest in water pollution began in the summer of 1969 when two teachers and one student of our school participated in a water pollution workshop at the Tilton School in New Hampshire. Teams of students and teachers worked together, pooled and tested their ideas, methods, and approaches to various aspects of water pollution. The materials that we developed were compiled and made available to each of the participating schools for use and testing in the classroom the following year.

During the summer of 1970, one student and one teacher again participated in one of a series of workshops at the Tilton School. The workshop was designed to test techniques for *A Curriculum Guide to Water Pollution and Environmental Studies* that at this time is available from the Superintendent of Documents, U.S. Printing Office. In our school, two teachers of biology and two 10th grade biology classes were involved in a pilot water pollution program in 1970.

The stream that was selected for study in the spring of 1970 was the Gwynns Falls Stream. It originates in the hills of Reisterstown and flows in a southeasterly direction through the city of Baltimore to empty finally into the Patapsco River. Gwynns Falls Stream was described in the 18th century as a pleasant rural stream. In fact, in 1798 it was suggested as a future water supply source for the city of Baltimore. During the latter part of the 18th century and during the 19th century mills were built along its banks. Later parks were developed in the valley of the stream. As late as 1907, an area along the stream was designated as a bathing beach and other areas of the stream were used for swimming. By 1940, the fish population was reported as being seriously depleted. Overflow pipes and debris were noted as possible polluting agents.

We selected the Gwynns Falls Stream for study because:

1. It is near the school;
2. Many of our students live near the stream;

3. It is accessible in a number of locations for study by groups of students.

A decision was made to study the stream at three sites: at a place the stream enters the present city limits, above Forest Park Avenue; inside the city, near the Edmondson Avenue Bridge; and in Carroll Park, near the point where the stream empties into the Patapsco River. We hoped that by studying the stream at these three sites, we could determine the effect of the human activities of the city upon it.

Due to the interest of the teachers and the enthusiasm of the students we continued our study of the Gwynns Falls Stream in 1971 and 1972.

Methods and Procedures

We decided to schedule the work on water pollution following units on population study, communities and ecosystems, and diversity, because we felt that the concepts developed in these units were necessary for the intelligent understanding and interpretation of any data we were to obtain in the study of a water ecosystem.

After general discussions on water pollution, the students selected the aspects of the stream they felt would be most helpful for them to study in order to obtain an over-all evaluation of the extent of the stream's pollution. The following were their decisions for team studies:

1. Dissolved oxygen (and IDOD)*
2. Living organisms in the stream
3. Coliform bacteria
4. Chemical characteristics of the stream
5. Flow of the stream

The preparation required for this unit was quite extensive for the teachers as well as the students. Time had to be allotted for the development of techniques that the pupils were to use in the field and in the laboratory. The teacher prepared the materials that would be needed by each student.

1. Background information and references on water pollution had to be provided.
2. Specific directions were provided for students on techniques and procedures for each aspect that was to be

- studied.
3. Guide questions were given to each student so that he could check his understanding of the concepts and techniques involved in his particular study.
4. Data sheets were supplied for: a. use in the field and laboratory; b. for compiling data of all of the teams.

Clearly defined behavioral objectives had to be established for each of the areas of study. These became the criteria for selecting the content, procedures and evaluations for the unit.

The laboratory activities were unstructured. Students within groups had the option of selecting, during a given period, those activities that were most appropriate for the attainment of his objectives. At each site tests were made to measure the amount of O_2 dissolved in the H_2O . From this it was possible to determine what forms the stream can support.

We used the Winkler-Azide Method for the determination of the concentration of dissolved oxygen and the immediate demand of oxygen. This meant that the students had to master the skill of titration as well as the method used for oxygen determination. In 1972, the students also used the Hach Kit for determining DO. We used it mainly as a check because the Hach Kit does not give fractional results.

Since algae and small invertebrates are very sensitive to the environmental changes caused by pollution, we felt a study of the kinds of organisms living in the stream at the three sites would be most helpful in our over-all evaluation. In the field the students used a number of devices for obtaining samples: plankton nets, samplers, etc.

With the cooperation of the Industrial Arts Department, Hester-Dendy samplers were made to collect benthic organisms. Fiber board squares and long bolts were used. At the ends two large pieces of the fiber board were placed together to allow the growth of organisms that do not thrive on exposed surfaces. A good population develops on the sampler if it is left suspended in a stream for two weeks or more.

The foremost problem of the students

* Immediate demand for D.O.

was that of identifying the organisms. This proved to be a real challenge.

Needham's *A Guide to Fresh Water Biology* contains excellent keys for algae and small invertebrates. C. Marvin Palmer's *Algae in Water Supplies* was favored by students because of the colored plates in the booklet that helped to make identification of the algae easier.

The *Activities Guide to Water Pollution and Environmental Studies* that I mentioned formerly also contains a simple key. There are diagrams that enabled the students to recognize the most frequently encountered fresh water forms.

The study of bacteria involved the detection of coliform bacteria as indicators of the probable presence of pathogens. The total coliform bacterial density is roughly proportional to the amount of intestinal pollution that is present. They are relatively simple to incubate. We used the Millipore Apparatus and techniques the Millipore literature suggests for handling, incubating and counting total coliforms.

Fecal coliform bacteria originate only in the intestinal tract of man and other animals. Growing them requires a special medium, MFC medium, and incubation in a water bath. We have been successful in incubating these bacteria by using an incubator in which pans of water are placed. The water is kept at a temperature of 44.5-45°C. Plastic bags containing the inoculated petri dishes are immersed in the water bath and kept for 24 hours.

The students' preparation involved developing the technique of using the Millipore apparatus, assembling and sterilizing apparatus and making media and buffer solutions.

It might be mentioned that a fairly accurate estimate of bacterial populations might have been obtained by the use of the pour-plate techniques that are suggested in BSCS manuals.

The quality of a body of water is directly related to the dissolved solids that are present. Commercial test kits are available that give relatively accurate quantitative analyses of dissolved solids. They contain detailed instructions that can be followed by students with very little help from the teacher. Most of them can determine other qualities of the stream such as: carbon dioxide content, pH, turbidity, and oxygen content.

We have used three different types of kits. Each has some advantages: The Hach Kit contains premeasured pillows of chemicals. The LaMotte Kits have another advantage: that of the teacher being able to use an overhead projector to show the results of reactions to the whole class. All of the kits that we used were accurate enough to give the stu-

dents a relatively good picture of the extent of dissolved substances present.

Those students determining the flow of the stream had to know how and where measurements were to be made in the stream and, then, how to use this data in determining the rate and volume of flow. Styrofoam balls were used for determining the rate or velocity of flow.

Two engineers from Fort Detrick went with our classes on one field trip in 1970 to demonstrate the more sophisticated instruments that the U.S. Corps of Engineers uses to measure the flow, turbidity and oxygen content of a stream. The students were pleased to compare their results with those obtained by these instruments.

The tests for oxygen, sulfites, ammonia, carbon dioxide and turbidity had to be done in the field. Most of the testing, identification and computations were carried on in the laboratory.

Data was recorded and averaged from similar teams of both classes.

Analysis of Data

The low amount of dissolved oxygen for Carroll Park in 1970 was no doubt due to the high organic content of the water. The high content of dissolved oxygen in the other sites may have been due to the excessive turbulence of the stream at the time that the tests were made. This supersaturated condition is not favorable for fish. It has been shown that their gills are damaged and the disease rate is affected by too high concentrations of oxygen in the water.

Hydrogen sulfide was present in 1970 (14 ppm, 11 ppm, 2 ppm) and 1972 (3.05 ppm, 6 ppm, 5 ppm). It has been shown that 1 ppm will kill trout in 24 hours, 3.3 ppm will kill carp in 24 hours, and 5-6 ppm will kill minnows in 24 hours. The possible source of the hydrogen sulfide could have been from sewage, industrial wastes or excessive decay of organic matter.

The high turbidity noted in 1970 and 1972 was due to the excessive rain on the days preceding the field trips. High water with its subsequent erosion would necessarily affect the turbidity.

The presence of sulfites at all of the three sites in 1972 is an indication that perhaps these substances were being introduced along the entire length of the stream.

The iron content of the water shows a definite increase in 1972 in the lower reaches of the stream. Excessive iron lowers the pH of water. The presence of 1-2 ppm is a definite indication of an acid pollution that will kill most fish. Iron is toxic to most organisms. However, it is used by iron bacteria that corrode pipe lines forming slimes, pits or encrustations. It has been shown that

even .1 ppm of iron is favorable for the production of slime growths that affect the gills of fish and smother their eggs.

The presence of chlorides at all of the sites in 1972 could have been due to erosion, fertilizers, winter salting, sewage or a combination of all of these.

A change in acidity from 0 ppm in 1970 to 30 ppm in 1971 and 15 ppm in 1972 in the lower reaches can be attributed in part to the increase in carbon dioxide, sulfites, iron and industrial wastes.

Carroll Park showed the lowest pH, except for 1971. The water at this point has a pH that is near to that of some acids (3.5 and 4.5). Such a condition would not be favorable to biological activity by most organisms.

A carbon dioxide content of 10 ppm and below in bodies of water can be attributed to natural processes that occur in the stream. Our results showed a much higher amount of this substance than would be expected.

Ammonia, a product of decay, shows a definite increase in 1972 at all sites.

The data obtained from bacteria shows a definite proof of the effects of man's activities on the stream. The highest count of total coliforms was made at the Edmondson Avenue site in 1972 following four days of rain (670,000,000 per 100 ml.). The high counts of fecal coliforms at all of the sites is a definite indication of the presence of organic matter from the intestinal tracts of man and animals - in other words, contamination by sewage. These counts also represent recent pollution because fecal bacteria have shorter survival rates than other coliforms. The smaller amount of total and fecal coliform bacteria obtained from Carroll Park in 1972 could have been due to the large volume of water flowing, under flood conditions, past this point in the stream. At no point of the stream did the total coliform count fall to the highest number allowed by National Standards for surface recreation or contact with the body. (2000/100 ml.).

It was difficult to believe that this stream could maintain such high populations of both types of coliform bacteria. A later check by professionals in the summer of 1972, however, confirmed our data.

Previous studies have shown that the presence of any single organism, except that of coliform bacteria, is not a definite indicator of pollution. The interpretation of data received from the study of organisms is difficult for tenth grade students. However, after studying the data, it was easy for them to make the following conclusions from data obtained from the study of the sites:

- No vertebrates were found living at this time in the Gwynns Falls Stream. The chemical content of the stream shows that it is unfavorable as a habitat for them;
- Other than bacteria, the populations of living things that have been found in Gwynns Falls Stream are mostly green algae, blue green algae, diatoms, and small invertebrates.
- The numbers of species found upstream are more numerous than those found downstream.
- The high populations of both types of coliform bacteria indicates that the stream is an open sewer as it flows through the city. It contains large populations of pathogens.

Summary

The evaluation of a stream is a time-consuming process and may be confusing to even the professional unless very extensive data is collected. Inasmuch as there are biological and other unlimited variables in every ecosystem, at best, our interpretations cannot be too specific at this point as to what is really happening in this stream. Therefore, to summarize these investigations we can make only the following statements:

- What was once a pleasant stream is now ugly, polluted, and barren of the types of life that we associate with unpolluted water ecosystems. It is a health hazard to those who come in contact with the water.
- As the stream passes through the city, it becomes more polluted due to man's activities. The dilution caused by flood conditions does not alter the ppm concentration of chemicals that are harmful to life.
- Over a three year period the stream has shown progressive deterioration.

We do not and cannot claim professional precision in all of our experimental results; nor are we unaware that some of the interpretations made by us may not be entirely correct. More importantly, however, these studies demonstrate the extent to which our students have become involved in the study of one of our most serious environmental problems.

Perhaps the best summary of our efforts is this one, taken from one of the student's folders:

"In the past this stream and the surrounding area have been beneficial to this community. There are a number of parks, golf courses and other recreational agencies in the area surrounding the stream. The defacing of this stream should be stopped. The community should clean up and control the pollution of the stream so that our children can enjoy once again the natural beauty of this area."

"putting it all together" — on your own . . .

FOUR ESSAYS

about four solo experiences with nature*

In The Woods By Myself

JIM GLOVER

Whenever I get in the woods by myself, it always makes me think back to when I was a kid, because we always lived in the country. It seems funny now, because I used to go out into the woods all the time, and never thought about what the names of all the different types of plants were. But as I sit here now, I cannot help but try to identify each plant I see. I am not sure if this is good. Perhaps I will never enjoy the woods again with the child-like innocence which I once possessed.

I had several of the plants categorized, but it was in reference to my own values. For instance, whether a tree was a "good climber" or not, or whether it would be a good "fort" tree. I suppose, in a way, this is how many plants get named, by people referring to them as useful within their own circle of reference.

I have been walking around a little bit and have just run into a blackberry bush, which makes me think of my childhood again. One of the few plants I did know by sight is the blackberry. I think that is probably the best taste known to a kid.

In my memory accompanying the taste of blackberries in a bowl of milk with sugar sprinkled over them, is the distinct aroma of insect repellent. I think the mosquito and pest season must be similar to the blackberry season, for I can vividly recall never going out for blackberries without a can of "Off," especially if you went in the early evening.

But the best aroma of all was of blackberry pies baking. Our goal, of course, was always to get enough blackberries so my mother could make a pie or two. Blackberry pie and a cold glass of milk on a summer evening can be nothing but a pleasant memory.

So, as I look around now, instead of seeing an American elm, or a witch's hobble, I'm seeing blackberry pies, catching lightning bugs, and trying to ride my next door neighbor's cow. The woods seem to be an excellent place for reminiscing with one's self.

An Hour At Hoxie Gorge

CONNIE MELLIA

The sun shines lazily on a path that twists and turns through the nodding, frost-bitten ferns. Ageless trees spike the scene, fallen needles form a thick pile carpet which muffle wandering footsteps. Through the tangle of bushes and trees, glimpses of a meandering gorge filter through. Noiselessly eroding the rocks below, the gorge water moves on timelessly. Oblivious to the weathering process of the gorge, a giant boulder supports a microcosm forest of its own — bedecked with lichen moss and tiny hemlocks — granite monument succumbing to annual greenery.

The trail slowly narrows until it almost vanishes into forest floor. Hidden by a screen of feathery pines, a field unfolds; islands of still-green grass swamped in a sea of weathered brown goldenrods and bracken ferns. A lone butterfly flits around looking for summer friends on an autumn day and moves on. The field climbs into a sloping hill. Far above, a movement invites investigation. I stalk the white-tailed deer close enough to see mottled colors of fur, evidence of Mother Nature preparing her deer with new winter outfits. An unwitting movement gives away my position and sends the white tails scurrying for safety at a graceful pace.

At the edge of the field a wizened tree stands mutely testifying to winter hardships. Not silent for long, a downy woodpecker signals his presence. Close by, black-capped chickadees delight in calling out their names. A little fruited apple tree is their stage and I am their captive audience. Sunflower seeds are produced and held out for them. Slowly, cautiously one brave chickadee breaks down the critical distance. Patience wins out over movement. Brave chickadee alights on a branch, looks into the eyes of a fellow creature and plucks a sunflower seed from the handful. Soon, others have followed his lead to the free snack. Slowly I move my hand away from the branches of safety, wondering if they will perch on my finger. Brave chickadee returns and procrastinates — looks into my eyes again and flies — onto my hand. Perched on my finger, he chooses one seed, gives it a shake, rejects it, selects another and flies off.

* Reports by college students in a field natural history class.

Soon, the seeds are gone and it is time to move on.

Silence is enfolding the forest. It is beautiful because one can hear so much. Motors are alien and human voices seem out of place. Chickadees continue their calling, water tumbles over protruding rocks, wind rushes through the remnants of summer's verdure. An hour alone can teach much. It lets one know that nature is in his roots. It is a silence full of wonders. Now broken, its memory occupies my mind.

An Afternoon At The Beach

ED CASSOT

It's Saturday afternoon. Yesterday I came home for Thanksgiving vacation. I always come to the beach when I return from school. It's so different now than during the summer months. There are hardly any people, and the beach returns to its natural state for the next half a year. It is strewn with debris—sea-shells, sea weed, remnants of living things and man's garbage.

The sun is shining through a hazy sky and along the horizon is what appears to be a reddish-yellow glow from the earth. There is hardly a breeze, which is uncommon but much more comfortable because if there was a breeze it would be cold. I am sitting on top of a sand dune looking out over the ocean. All around me is dune grass almost all dried out but with a trace of green. Here is a trail of seagull prints leading through the grass and down my dune. It looks like he was here recently.

The ocean has always enchanted me. As I look out as far as the water goes I think of what lies beyond, so far away. I also think of all the life in the ocean, so quietly existing without too much interference from man. Today the water is calm far out, but close to shore the breakers are full of power and foam. Each wave creeps closer and closer to my dune but I'll be gone before it reaches me.

The only animal life that I have seen are starfish that have been washed to shore and the sea gulls. Sometimes a single gull flies by and others times a group does, but they always manage to disappear out of sight. They may be scavenger birds, but they truly belong to the sea. Their flight is so graceful when they glide and with a dip of the wing, they're on a new course. And how close to the water they fly! They must be looking for food, though they glide so fast I don't see how they would find anything. Of all the bird calls I know, which may not be many, I like the call of the gull the most. I can't describe it, but it brings many pictures to my mind

when I hear it. After reading *Jonathan Livingston Seagull*, how can I not have admiration and a liking for these birds of the sea?

When I find myself where nature appears so beautiful, like here or in the mountains, I can't help but think of God, even if it is just a flashing thought. I believe that God had a hand in making beautiful places in the world. Its a good feeling to have.

The wind is coming up, the sun is going down, and the reflection on the water is magnificent. I can see my brothers, sister, and dog down the beach coming towards me. Flip is chasing Tygre and I can see my sister motioning. "Don't you dare get wet!" It's days like these you remember—a frolic on the beach with your little brother and family. Sitting here has made me appreciate many things and I feel good!

I see the moon way over in the east, just waiting for the sun to go down so he can pop up overhead. It appears comical to me; one goes up, the other goes down and sometimes they cheat on each other.

An Hour or Two at Watkins Glen

DAVE DUNBAR

Having been through this gorge and along its ridges many times, many things have happened to me here. Everytime you go any place, it is different than the last time. The first thing that happened to me, before I even got to the Park, was that I was followed by an indiscourageable spy, namely my nine-year old brother. After giving him the slip through a couple of alleyways, I found he knew where I was headed and was already waiting for me at the Park. So conceding to the inevitable, I picked up a curious companion, who, along with me, became soaking wet and half-frozen while missing Sunday dinner.

What grabs your attention as soon as you enter the Park is the water. It blots out completely the sound of the trucks and cars of town; lets you get into yourself easier. We were the first ones into the Park, according to the snow. I saw the water that day as a population, much like ours, with different personalities. There was water that fell, digging out the rock. There was water that flowed very calmly, seeming that it could never wear the rock as it did. This one kind of water was very fine, rising from the base of the water fall.

There was the white snow that had its fun somersaulting down steep banks. The most interesting species of water was the ice, which had many genetic variations causing a number of fascinating shapes. Although very pretty, this

water was very cold-hearted, always trying to make us fall and sometimes leaping from the cliffs trying to knock us on the head.

It was interesting to watch my brother's face when he found out what "liver-wurst" looks like before Armour Star picks it from the rocks and processes it.

Our trip that day was a lot of fun. It was amazing to see the adventurism in my companion as we risked "life and limb" travelling through the one-time Indian territory. I also picked up again how things of nature offer great amounts of material for stories of all sorts.

We had seen most of the Park by the time a number of people began coming, so we marched on into the sunset and lived happily ever after.

Welcome New Members

Walter T. Ahearn, Columbia, S. C.
Alliance for Environmental Education,
Green Bay, Wis.
Joanne Azarnoff, Shawnee Mission, Kan.
G. H. and A. F. Beatty, State College, Pa.
Bethune Elementary School,
Jacksonville, Fla.
Mildred A. Brooks, Ossining, N. Y.
Wayne Brooks, Brighton, Ontario
Peter D. Clark and Family,
Greenwich, Conn.
Community College of the Finger Lakes,
Canandaigua, N. Y.
Millard C. Davis, Pennington, N. J.
Dryden Central School, Dryden, N. Y.
David M. DuMond, Wilmington, N. C.
Albert E. Feldman, Poughkeepsie, N. Y.
Barry Feldman, Poughkeepsie, N. Y.
Field Museum of Natural History,
Chicago, Ill.
John Fowler, Cortland, N. Y.
Thomas L. Francis, Panama City, Fla.
W. Randolph Frykberg, Grand Rapids, Mich.
Robert C. Funk, Milford, Ohio
Mike Garrett, Ponca City, Okla.
Lynn Garrison, Essie, Ky.
Ned Gatzke, Port Washington, Wis.
Michael Greco, Cortland, N. Y.
Anne Gregory, Seattle, Wash.
David Hogg, Dayton, Ohio
Roy Hyatt, Pensacola, Fla.
Robert Jenkins, Arlington, Va.
Michael Link, Sandstone, Minn.
Wendy Repass, Marion, Mass.
Theodore Roosevelt Birthplace,
New York, N. Y.
Beth Sanford, Greenfield, Mass.
Mrs. Elizabeth Sharp, Dayton, Ohio
Patty Stuchel, Irwin, Pa.
Mrs. John Swope, Lebanon, Pa.
Mrs. John D. Woodcock, Tabor, N. J.

Vision from "Rite of Spring"

*It is not languid sweet
tranquil unfolding*

*It is the sap that courses and
forces the root in the earth;*

*It is the blood that burns and surges
and urges release;*

*and the bursting of leaves into air and
the pairing of beasts.*

JOYCE KANTOR

"putting it all together" at a wildlife camp . . .

Burgundy Wildlife Camp: Where Patterns of the Wild Set Patterns of Learning

JOHN TROTT

"In wildness is the preservation of the world." The words of Henry David Thoreau, written more than a century ago, have a contemporary ring. Today the natural and the civilized worlds must live together or perish separately. To the trained eye of the professional ecologist the functions of a natural plant and animal community present an intricate balance of life. The sensitive and curious youngster can, with the help of an enthusiastic and knowledgeable guide, perceive this balance in the out-of-doors.

Both the scientist and the younger observer sense the serenity that comes from continuity and harmony in nature. Beauty is experienced in the flight of a bird, the perfection of a leaf, the function of a flower and the drifting of snow. The exuberance of nature evokes the wildness about which Thoreau wrote.

This harmony and order combined with vitality and never-ending beauty give us a guideline for teaching. The Burgundy Wildlife Camp has based its methods for learning on the patterns of the wild. The opportunity to observe and truly experience these patterns and to pursue an area of interest can change the direction of a life.

Burgundy Wildlife Camp began ten years ago as an outgrowth of Burgundy Farm School in Alexandria, Virginia, in response to a need for a summer experience which would give upper-grade youngsters a chance to use in a purposeful way the knowledge and understanding of the natural world gained from their school experience. The school, a non-profit private cooperative day school operating in a natural twenty-three acre wooded setting, has always placed a great deal of emphasis on natural science in its overall program.

The first summer the camp operated in a rented lodge near the Cacapon River in West Virginia with 12 boys and girls, age 11-15, in each of three two-week sessions. There were 20 youngsters in 1964, 22 in 1965, and 25 in 1966. 1966 was a crucial year. The rented lodge would not be available indefinitely and suitable land had not yet been found for a permanent site. Finally 468 acres with sufficiently varied habitat was found in the same West Virginia area. Called Coopers Cove by

the local residents, it is a great bowl ranging in altitude from 1200 to 2000 feet, with open meadows, marshes, pine thickets, deciduous and evergreen woodland, natural balds and mountain streams. Two hundred acres of the land were sold to conservation-minded individuals to finance the building of the roads and camp facilities. Camp opened at the new site in the middle of the 1967 camp season. At the present time the camp has a main lodge and two dormitories and accommodates 32 campers and 19 staff members each session.

Since the camp started, approximately 1000 boys and girls have attended one or more sessions. They come from all over the country as well as from the Burgundy school community and the Washington metropolitan area.

Enjoy Intellectually and Aesthetically

The underlying philosophy of the camp is that it is important to provide an opportunity for the young to enjoy and experience the natural world on an intellectual and an aesthetic level. Concern for the environment must come early in life, early enough to be a strong vital part of the individual. It is a combination of the emotional appeal of the natural world with the detached scientific attitude. It is the sharp awareness of beauty that one feels on seeing a black and white warbler as he jerks and probes around the trunk of a white oak. It is also a concept of why this bird is called a warbler, why he is in the woods instead of in the open field, how he is equipped for eating minute insects instead of the seeds of the thistle, and why he is here now in summer instead of in some dense tangle in Central America. These two attitudes toward the natural world are not incompatible. They are the mark of the naturalist and effective conservationist of today. Thoreau had both, and so did Aldo Leopold.

The first days of any camp session are used to give the camper basic concepts and understandings in botany, ornithology, meteorology, herpetology, entomology, ecology and other related fields. With this background he can then participate fully in the follow-up, using his initial area of interest as a point of departure for broader understanding and wider experience. He is encouraged to

select and carry out individual projects and is given the opportunity to specialize and pursue as far as ability and imagination permit. Group learning continues along with the rare and valuable one-to-one experience. The eco-systems of the Cove are investigated as a whole, "taken apart," studied, and then put back together again, keeping in mind that the youngster participating will gain a better and more lasting understanding of the whole ecological picture if he is guided and helped to analyze in terms of his own particular interest. This becomes his key for understanding.

A Day in the Field

A typical day begins with the whole camp and staff leaving for a field trip soon after breakfast. The ecological approach is emphasized on long leisurely walks. There is constant questioning. How did this plant come to be here? How has man affected this place? What did he do wrong? Why are there so many thistles and viper's bugloss in this field? Goldfinches and indigo buntings are common. Why? Butterflies are everywhere! This puzzle was eventually solved. Though badly overgrazed and abused in other ways, the old farm had never known pesticides.

Afternoons are different. A camper may specialize, go deeper into some interest sparked during the morning trip or pursue the interest that brought him to camp in the first place. Choices range from putting up mist nets for capturing and banding birds, identifying and cooking mushrooms, keying down plants collected during the day, sitting in a blind at a field sparrow nest and waiting for the adult to return and feed so that it may be photographed, working on the camp herbarium, collecting, identifying and spreading insects, or learning to make a bird study skin. There is free time to wander alone in the wood, read, or just talk.

During the evening there are wildlife movies, seminars on conservation problems or lectures from visiting specialists. Visitors have included Chandler Robbins, well-known ornithologist and author; Ann and Myron Sutton, authors of *Appalachian Trail*, *The American West* and many other books on the out-of-doors; Shirley Briggs, artist, editor, biologist, and Executive Director of the

Rachel Carson Trust; and Larry Hood from the Endangered Species Bureau of the Department of the Interior. Mrs. Bradley Fisk, philanthropist and conservationist, has visited the camp and been very interested in helping to support and expand its program.

What is at hand is always used as a teaching device. The natural, most prominent feature of the natural world is used as the focal point for the broad emphasis of each session. Nesting activities of birds with all the related fields of territoriality, courtship, display and song patterns often dominate the first session of camp, which begins in mid-June. Late July and early August are the time of varied insect activity and this largest group of living things takes on tremendous importance to the program. During spring weekends the emphasis is on the wildflowers that blanket the cove in May. The how and why of changing foliage dominates October programs along with photography and the discernment of differences of leaf color as one ascends a mountain.

Art and Literature

Art in the form of black and white and color photography, sketching, and painting with water color has become an important part of the camp program. Through art, young people can experience and perceive natural life in a personal and lasting way.

The camp has an extensive library (most of the books are loaned) not only of resource materials in the many branches of the natural sciences but also representing the outstanding writers of interpretive descriptive prose in the field. Edwin Way Teal, Donald Culross Peattie, Aldo Leopold, Thoreau, Sally Carrighar, and Loren Eiseley are all popular. Campers read a great deal and are encouraged to do so.

Scientific Activity

Even though the educational and recreational aspects of wildlife and conservation studies are the most important functions of the camp program, there have been other contributions on a solid scientific level. A study of the breeding bird population of a twenty-acre tract as revealed through a four-year accumulation of banding data and field observations was published in *The Redstart*, July 1968 ("Summer Bird Population Studies in the Cacapon River Valley - Hampshire County, West Virginia"). Written by the camp director and a staff member, the paper suggested interesting shifts in bird populations from 1963 through 1966. There is evidence that some of these changes were due to the drought that dominated the weather pattern in the Cacapon River Valley during the period.

Staffing

Over 95% of the staff at the camp are former campers. Their responsibilities are not clear cut. This is part of the overall philosophy of a commitment to the basic idea of the wildlife camp program. Human ecological relationships are patterned after natural eco-systems. The patterns of the wild offer excellent examples for learning. The young staff, high school and college age, perform a wide range of duties to create an individual and varied program and make the camp function smoothly. They create a serene atmosphere in which young people can learn.

A staff member may teach astronomy at night and have the responsibility of being a full-time assistant to the kitchen manager. The instructor of life in the stream and pond, who also teaches insects, runs the camp store and is in charge of cleaning the main room each morning. The camp secretary teaches identification of grasses. In other words, the staff members have responsibilities, chosen by themselves or assigned by the director, which range from teaching, leading field trips, cleaning, supervising younger staff, clearing trails, assisting with swimming, moving furniture, parking cars on opening day, greeting parents and directing traffic at the end of our one-lane road.

Future Plans

The present plans are to expand the camp program to six months in 1973 and eventually go to a twelve-month program. This will require new winterized building and facilities and a permanent staff in residence. The new program will be integrated with the program of Burgundy Farm School and will make it possible for the school's upper grades to spend several weeks of the school year at the camp. The summer program will continue but will be expanded to four sessions. Classes from other private and public schools will be invited to participate in the program during the school year.

Interest in the program has been expressed by several Federal agencies and by adult groups involved in environmental concerns. The Office of Environmental Education has been looking at the Wildlife Camp as a model not only of its kind, but also for its teaching techniques, which they hope to use elsewhere in the United States. The camp received a grant this year for the development of a published curriculum. The project is currently underway. Two camp staff members spent several months in Cleveland last spring to develop teaching materials for elementary and junior high school students in the Beachwood Public and University schools.

STEP

**STUDENTS TOWARD
ENVIRONMENTAL PARTICIPATION**

A Program For High School Students

*Co-sponsored by
The U.S. National Park Service
and
The United States National Commission
For UNESCO*

Are you planning to start or expand an environmental education program in your high school?

Are your resources limited?
Would it be useful to know what others are doing?

If your answers to the questions above are "yes," STEP may have some of the other answers you're looking for.

STEP is an environmental awareness and actions program for high school students. It is a *student* movement.

- ... invented by students
- ... started by students
- ... run by students

It succeeds only as its student members succeed.

Teachers and other adults provide advice and support as needed—but as counselors and facilitators, rather than as supervisors.

A high school STEP program does the following:

- Helps students to relate in a personal way to their environment.

Imparts basic principles of ecology which are useful in understanding any urban or rural environmental situation in which students might find themselves.

Shows them how to share what they have learned with others.

Shows them how to work toward the solution of local environmental problems which they themselves have identified, studied, and selected for corrective action.

STEP is in every case a local program. Each STEP program is unique because participants themselves decide how to make it fit the interests of individual members and the needs of their school and community. STEP projects are sometimes carried out by individual students, sometimes by groups. STEP is doing its job when each participant genuinely feels that he is doing something worthwhile for himself, his school, his community, and the environment.

STEP offers no fixed programs or re-
Continued on page 16

GOOD READING for Environmental Education and Interpretation

BEN HALL

Nature's Pincushion The Porcupine by Ralph Buxton. Ill. by Angus M. Babcock. Golden Gate Junior Books, San Carlos, California. 1972. 26 pp. \$4.33.

This is a small book, when you subtract the space occupied by the numerous illustrations, yet it contains a surprising amount of reliable information. The excellent illustrations occupy about as much space as the text (every page has at least one) and are equally important in communicating the book's message. They are realistic drawings in two colors and are as pleasing to the eye as they are informative. They are closely coordinated with the verbal content of the book. No age level is specified, but the jacket says that the story is "told for youngest readers." It is an excellent beginner's introduction to the natural history of this well-armed but peaceful animal, telling about its defensive quills; the enemies that kill it occasionally in spite of that defense; its food sources (entirely vegetarian); its teeth, which will grow out of bounds unless worn down by normal use; and its breeding habits. This book deserves a wide audience.

• • •

New at the Zoo: Animal Offspring from Aardvark to Zebra by Terry Shannon and Charles Payzant. Ill. with photographs. Golden Gate Junior Books. San Carlos, California. 1972. 80 pp. \$4.95.

Addressed to children of age 10 (grade 5) and up, this book deals with the reproduction of animals, as it takes place in zoos and animal parks. It tells how zoos are run, how they help preserve endangered species, and how they serve as places where you can see animals you would never have an opportunity to see in the wild. As the authors write, "Some scientists believe that the day may come when the only remnants of wildlife left on earth will be those cared for in zoos." (Would not human life have become completely intolerable long before that?)

This book is essentially a collection of interesting photographs of young animals, chiefly mammals, with a few reptiles and birds. The photographs are from many sources, which are identified in the Picture Credits on the last page. They are explained by an informative, readable text. There is an Index, most of whose items are the names of animal species and of zoos. The young reader is informed about the many kinds of learning experiences zoos offer. This is

given a "do-it-yourself" slant when he is told to "Choose an animal, any animal from aardvark to zebra, and find out everything you can about the animal of your choice." Then the authors give examples of what sort of things might be learned if the reader were to choose the aardvark or the hippopotamus, the mandrill or the zebra.

There is a great deal worth knowing for the young reader in this book and in the zoos it encourages him to visit. One might hope, however, that he will also learn that commonplace animals, free in natural surroundings, can be as interesting as the most exotic ones captive in a zoo.

• • •

The American Alligator: Its Life in the Wild by Edward R. Ricciuti. Ill. with photographs. Harper and Row, New York. 1972. 71 pp. \$5.95.

The word, "American," in the title of this book is more than usually appropriate, for the alligator is found in the wild only in the United States. This also implies that its preservation as a unique part of our natural environment is entirely up to us Americans.

This book is intended for readers of age 10 and up. It is illustrated by a collection of photographs that convey a vivid picture, not only of the alligator itself, but also of the environment it lives in. The book is divided into four main divisions, dealing, respectively, with the alligator's "History," both evolutionary and recent; its swampy habitat; its life cycle and habits; and the problem of its survival in an increasingly hostile world. The author, a former Curator of the New York Zoological Society, is well qualified. There is an Index and a list of books for further reading. This book will not only contribute much to the reader's understanding of the life of this peculiarly American animal, but will also awaken him to the urgent necessity of protecting it as an irreplaceable natural resource.

• • •

Seahorse by Robert A. Morris. Ill. by Arnold Lobel. Harper and Row, New York. 1972. 60 pp. \$2.50.

This is one of the series of *Science I Can Read Books*. It is intended for children of ages 4-8. It should serve well to introduce a child to the fascinating world of seahorse and aquarium. The abundant illustrations are both pleasing and informative; they should help significantly in capturing a child's interest. The author's qualifications are excellent; they include

past experience as curator at Marineland of Florida and at the New York Aquarium, together with a master's degree in Marine Biology. In addition, he knows how to write in a style suitable for very young readers.

• • •

Secret Neighbors: Wildlife in a City Lot by Mary Adrian. Ill. by Jean Zallinger. Hastings House, New York. 1972. 64 pp. \$4.95.

One of the rewards of the biologist is that the objects of his study are to be found almost everywhere. He doesn't have to go to remote wildernesses to find them. Even in the heart of a great city he can find an abundant flora and fauna. Some plants and animals, such as the ailanthus tree and the cockroach, have become true city dwellers. The ways in which these living things adjust to a largely man-made environment are quite as interesting as their adaptations to wilder situations. Thus a vacant lot in the heart of a metropolis, when you look into it, can be a fascinating museum of living natural history. It is a joy to find that children are being introduced to this subject of "urban natural history" by such an excellent book as Mrs. Adrian's.

This book is written for readers of ages 7-10 (grades 2-4). The chapters are grouped under the four seasons of the year. The doings of the animals are told in story form, with the names of the species used as proper names: "Field Mouse," etc. Included in the cast of characters are children, an ice-cream man, an alley cat and a dog—all of them true members of the urban fauna. Even man's refuse becomes an important part of the environment, as when a spilled garbage can provides food for various creatures, a tin can of water serves as a pond for mosquito larvae, and litter provides shelter to a hunted mouse or hibernating insects.

An Index lists the animals and plants dealt with. There is also a bibliography of books that can be helpful to both the child and his teacher. The illustrations are attractive and effectively related to the text.

• • •

A Day and a Night in a Tide Pool by Mary Adrian. Ill. by Genevieve Vaughan-Jackson. Hastings House, New York. 1972. 63 pp. \$4.95.

This book describes the doings of a few major characters, such as Hermit Crab and Dog Whelk and Starfish. In doing so it describes the other organisms

these characters encounter, in the processes of food-getting and preserving themselves against becoming the food of other predators. The author's Foreword describes Tide Pools in general, with mention of the problems of Pollution and of indiscriminate collecting. In addition to an Index and a Bibliography, there is a final chapter, a sort of appendix to the main account, on "How to Observe Life in a Tide Pool," which tells briefly about collecting, making an aquarium and photographing without the aid of elaborate equipment. The numerous illustrations, consisting of black-and-white drawings, are good.

What is That Alligator Saying? A beginning book on animal communication by Ruth Belov Gross. Ill. by John Hawkinson. Hastings House, New York. 1972. 48 pp. \$4.95.

No age level is indicated, but this book is evidently intended for younger children, in the lower grades. It is well illustrated, in pleasing colors. There is an Index, divided into two subdivisions: Animals and Other Subjects. The latter is further subdivided into: Baby animals and their mothers; How animals communicate; Experiments; and What do animals communicate about? The Index thus furnishes a convenient outline of the contents of the book. The text closes with "A note from the author." It deals with how to find out more about animal communication, by further reading and by watching what animals do. This note ends with the suggestion that "Maybe you will find something out that nobody knew before."

Seeing What Plants Do by Joan Elma Rahn. Ill. by Gimmy Linville Winter. Atheneum, New York. 1972. 58 pp. \$4.95.

The chief merit of this book is that it will lead children not only to read about plants but to go to the plants themselves for information. It is a book of simple observations and experiments, easily performed by a child and requiring the most ordinary materials. The experiments deal with plant structure (seeds and embryos, leaf forms, stems, buds and roots) and the processes of plant growth (including plant nutrition, growth and development, water and light relationships and reproduction). Written by one who is well-trained in botany and experienced in the teaching of it, the contents of this book are scientifically accurate. It is written in a clear, simple, unpretentious style that is not always found in natural-history books. The illustrations are diagrammatic but informative. An additional merit of the book is its sturdy binding, suited to withstanding much

handling by soil-covered hands.

• • •

The How and Why of Growing by Lorus and Margery Milne. Ill. by John Pimlott. Atheneum, New York. 1972. 131 pp. \$4.95.

When writing about so big a subject as Growth, the question of what to include becomes crucial. The authors of this book have collected an impressive amount of material and have presented it interestingly, in a style well suited to young readers, skillfully avoiding a needlessly complex vocabulary. There are, however, some unfortunate omissions. The importance of cell division and differentiation, for example, is not stressed (neither "cell" nor "cell division" is included in the Index). The illustrations are excellent and add much to the attractiveness of the book; but they seem to be more decorative than informative. They show only the exteriors of plants and animals, whereas, much that is important in growth is internal, not externally visible. To take some examples from the chapter on "How Plants Grow": A simple drawing of a wood cross-section, as seen under low magnifications of the microscope, would greatly clarify the descriptions of what growth rings are, that is, regions where small vessels of summer wood are succeeded by the larger ones of spring wood. Buds (another word not in the Index) are described externally, but not what is inside them. The fact that in mid-summer the buds of a maple tree (which the authors use as an example) contain the twig segments, leaves, buds and flowers that will appear next spring, albeit now in minute, embryonic form, is not mentioned. And what of the embryonic apex of the miniature shoot contained in the bud, and its way of maintaining itself as a growing region? All this could be described, with the aid of a drawing of the longitudinal section of a bud, in a few simple sentences. The same thing is true of the growth in thickness of a tree's trunk, through the activity of the cambium. These facts about the localized and repetitive nature of plant growth are too significant to be overlooked. Perhaps what it boils down to is that more than one book is needed to do justice to this subject, and that the authors of the present book would have done better by dealing with fewer concepts, but at greater depth.

• • •

The Code of Life by Alvin and Virginia Silverstein. Ill. by Kenneth Gosner. Atheneum, New York. 1972. 89 pp. \$4.50.

A clear and interestingly written account of DNA and its functioning as a "code" for "blueprints" of the growth,

development and heredity of living organisms. Technical terms are used only when indispensable, and their meanings are explained when the words are introduced. The book brings the story of molecular biology up to date, describing research published as recently as 1970. It also describes some of the probable directions of future work, in the final chapter on "Genetic Engineering and Other New Frontiers." The cooperative nature of scientific discovery is shown by the authors' use of the names of the more important scientists and descriptions of their contributions.

Errors of fact or interpretation are difficult to find. Perhaps it is being too fussy to point out that chromosomes do not look like strings of beads, as the authors stress, but may be figuratively described so because of the particulate nature of genes and their linear arrangement in the chromosomes. And one might complain about the excessive use of the words, "Scientists" or "Science," as subjects of verbs; on page 13 alone there are six instances of this.

The age group to which the book is directed is not clear to the present reviewer. It is ostensibly written for children; but except for the occasional use of second person plural ("You have probably suffered from a number of virus diseases"), and the speaking of *Drosophila* larvae as "new babies," there is little evidence of this. And with the abstract nature of the subject matter and the unavoidably verbal way of communicating it, it is rather rich nutrient for any but the most mature and intelligent of children. From my experience as a teacher, I would expect that even college students could profit from reading the book.

The illustrations, although mostly diagrammatic, are well fitted to the text. An index adds to the usefulness of the book.

• • •

The Long Voyage by Alvin and Virginia Silverstein. Ill. by Allan Eitzen. Frederick Warne, New York. 1972. 47 pp. \$3.95.

As the subtitle states, this book describes *The Life Cycle of a Green Turtle*. A great deal of information is communicated in the form of a lively and interesting story. The chief characters are the turtles of two generations, and a boy who observes them. With his father aboard a research vessel, he helps tag the newly hatched turtles on Ascension Island with radio transmitters, in order to follow their westward migration across the Atlantic to the coast of Brazil. Some years later, as a trained man, the boy finds his vocation in the scientific study of the turtles and their ways. Thus the

book fulfills two aims, of presenting the fascinating story of the sea turtles in a form suitable for young readers, and of indicating some of the potentialities of biology as a life work. The excellent illustrations make the book as pleasing to the eye as it is interesting and informative.

* * *

Neighborhood Puddle by John F. Waters. Ill. by Kazue Mizumura. Frederick Warne, New York. 1971. 40 pp. \$3.95.

A simple story about the genesis, development and demise of a temporary pond is used as a framework on which the animals and plants associated with the water are described, including the children who come to play and observe. A large number of plant and animal species are described and illustrated clearly. Children without any science background might find the vocabulary an obstacle; such terms as *cyst*, *metamorphosis*, *larva*, *pupa*. A good deal of information about the ways of living of the organisms is included; yet it could be objected that the book is too much a list of names of living things the reader has not seen or heard of. It can be hoped that the young readers of this book would be led to look more carefully at the next such pond they encounter, with its abundance of tiny, active lives.

* * *

The Fox Book compiled and edited by Richard Shaw. Ill. by several artists. Frederick Warne, New York. 1971. 47 pp. \$4.95.

This little anthology of fox lore is a collection, as the jacket tells us, of "fables, ballads, folk tales, stories and poems." The 15 items, from a wide variety of sources, are illustrated by 15 pictures, by 14 different artists, who are identified in the List of Illustrations. Many of the illustrations are full-page plates, and all but three are in pleasant colors. There is no Table of the verbal Contents of the book. Another omission is the lack of an author's name or source at the ends of five of the items.

The fox that emerges is more a product of folklore than of natural history. He is an intelligent creature who uses his wits to serouge a living out of an unfriendly world, but whose very cleverness is often his undoing. By and large, he is presented as something to be loved, not as a "varmint" to be wantonly destroyed.

* * *

Outdoor Fun: Learning to Look at Our Environment by Allan and Ellen Bonwell. Illustrated. Area Cooperative Educational Services, North Haven, Connecticut. No date indicated. 30 pp. \$1.00. Softbound.

This booklet professes to be devoted more to nature-study activities than to information — "We are concerned with what to do outdoors and how to enjoy the doing," the authors write. Yet as a whole it is rather ambiguous as to its themes or aims. For example, page 24 states concisely eight "Basic Ecological Concepts." The next section deals with "Teaching Basic Ecological Concepts." The first concept is dealt with in this way; but the remaining items are elaborations of the Concepts; they are not about teaching devices or methods. And on page 14 we read that "One of the best wildlife studies ever done was by an uneducated backwoodsman who all his life kept a list of birds with special reference to a bit of land . . . His work led others into the field. . ." Yet no clue is given as to the identity of this man, or where to find the record of his work.

The illustrations leave much to be desired. The leaf prints are pale; many of them would not help much in recognizing the plants. Mr. Bonwill's drawings are much clearer and more informative than many of the prints. The booklet contains much interesting information and ideas. It is unfortunate, therefore, that its defects make it less useful than it could be.

* * *

Maypoles and Wood Demons by Elizabeth S. Helfman. Ill. by Richard Cufari. Seabury Press, New York. 1972. 128 pp. \$5.95.

This book deals with two topics: 1) What trees are and how man uses them (briefly); and 2) The folklore that throughout the world has grown out of man's association with trees (this the book's main concern, as indicated by the subtitle, *The Meaning of Trees*). It is an interesting and well-written book, with numerous illustrations well suited to the content of the text. It is addressed to children of ages 8-12, in grades 3-7. Some of its chief topics are: Trees as objects of worship; Trees as habitations of demons, fairies, etc.; Trees to celebrate the major events of life (such as Christmas trees); Myths about trees that explain the origin of the universe and of mankind. Good books devoted to these aspects of tree lore are not as abundant as books on the biology of trees, so it is a pleasure to come upon as competent an effort as the present one.

There are two good features of this book that are not common to books of this sort. One is a list of "Books for Further Reading," including some books it identifies as "adult books which may be of interest to older children." The other feature is an Index, which can contribute to the usefulness of the book as a reference, after a first reading.

Birds at Home by Marguerite Henry. Ill. by Jacob Bates Abbott. Hubbard Press, Northbrook, Illinois. 1972. 88 pp. \$5.95.

A revised and redesigned Anniversary Edition of a book first published in 1942. It is addressed to children of ages 9-13 (grades 5-8), but can be enjoyed by older people who are young of heart. The first and last chapters are concerned with the economic value and behavior of birds in general. Each of the remaining 21 chapters deals with a single common bird species (of the Northeastern United States), describing their nesting behavior, food, song, migration and economic value in a lively and interesting manner. The book is illustrated by 12 full-page colored plates and numerous black and white drawings in the text. In addition, two of the plates are reproduced in full color on the front and back covers, while black-and-white drawings brighten up the end papers. All of this contributes to making an unusually attractive book. It would be an excellent gift, containing a bonus gift in the form of a child's awakened interest in birds. Her Newbery Award and this present book speak well for Mrs. Henry's success as a writer for children.

* * *

My Daddy Longlegs by Judy Hawes. Ill. by Walter Lorraine. Crowell, New York. 1972. 34 pp. \$3.75.

This is one of the extensive series of *Let's-Read-And-Find-Out Science Books*. The present book has excellent credentials: its author is well experienced in teaching children in the lower grades; and it is edited by a Professor of Education and a Scientist of established reputations.

A surprising amount of information is contained in this small book. It deals with the following topics, among others: Where to find the daddy longlegs and how to maintain it in cages for convenient observation. Its food and its way of capturing it. Its external anatomy, including the sense organs and simple methods of locating them. Protective coloration and odor glands. Reproduction. Growth and development, including molting. Responses to such environmental factors as temperature, sunlight and moisture.

Written in direct and simple language and relying heavily on the fine illustrations, the book conveys a surprising amount of information. It not only tells the child about daddy longlegs but directs him to observe the living animal.

* * *

Mushrooms and Molds by Robert Froaman. Ill. by Grambs Miller. Thomas Y. Crowell, New York. 1972. 31 pp. \$3.75.

This is another of the *Let's-Read-And-Find-Out* Science Books. The text is written in simplest style, intended for very young readers. The words occupy less space than the illustrations, which are pleasing to the eye and well suited to the content of the text. Some of them are printed in color, the rest in monochrome. The reader is not only told about fungi, but is instructed how to grow them on a piece of bread and how to make spore prints of mushrooms. The reproduction of fungi and their work in preparing the soil for the higher plants are stressed. A good vehicle for introducing the child to knowledge through reading, looking at pictures and, best of all, by the direct observation of the living fungus.

Polar Frontiers, A Background Book About The Arctic, The Antarctic, and Mankind. Parents' Magazine Press, New York. 1972. 264 pp. \$4.95.

This is one of the publisher's extensive series of "Background Books for Young People." Although addressed to readers of age 12 (grade 7) and up, there would seem to be no upper age limit for persons who could read it with pleasure and profit. It is exceptionally well written, in a simple and clear but vivid and interesting style. The account of Arctic exploration by Europeans, for example, reads like a fascinating adventure story. The reader, young or older, will find it a good introduction to these remote regions, dealing, among other things, with the physical nature of the polar environment; the people who are able to get a living out of these extremely inhospitable surroundings; the effects of encroaching civilization on these people; the animal life — whales, seals, walruses and polar bears are among the largest and most important economically; and the mineral resources, such as oil, iron and uranium.

The book is indexed carefully and thoroughly (10½ pages of it). An extensive Bibliography (2½ pages) is another helpful feature. Eighteen superscript numbers in the text refer to notes at the end of the book, all of which are literature sources of major ideas or facts. The two two-page maps, of the North and South Polar Regions, respectively, are helpful. Unfortunately, these two indispensable items are the only illustrations in the book. This is a major deficiency, since many of the things dealt with call for more than verbal description. (For example, "microblades" of flint are described as important archeological data: what do they look like?) Adequate illustrations would, of course, increase the cost of the book, but it would be worth it. That the book is so

interesting and informative in spite of this lack, speaks well for its compensating merits.

• • •

Simple Science Fun: Experiences with Light, Sound, Air and Water by Bob Ridiman. Ill. by author. Parents' Magazine Press, New York. 1972. 51 pp. \$3.95.

Written for children of ages 4-8, grades K-3, this is a book of observations and experiments suitable to children of this age level. It is divided into four sections, each devoted to one of the four environmental factors listed in the subtitle. Two of the experiments described will serve as a fair sample of the content of the book. An apple impaled on a pencil, turned on its axis by the hand holding the pencil, represents the earth; a flashlight as the sun shows what causes the alternation of day and night. A small mirror placed slanting under water reflects light which, passing through water and then through air, falls on a white card, forming a spectrum of colors. The words of the text are few and simple, everyday ones; when a word like *luminous* or *reflect* is used, its meaning and pronunciation are made clear. The illustrations are well suited to the purpose of the book; simple cartoons of children or animals and diagrams of experiments, done in black and a single color against the white background of the paper.

This book is evidently based upon the tacit belief that children learn best by direct observation and manipulation of the things that make up their world. Also implied is the idea that this sort of learning is one of the best kinds of fun.

• • •

Stepping-Stone Books to Science and Social Studies. Parents' Magazine Press, New York.

The following books in this series have been received for review:

Homes, Shelter and Living Space by Joanna Foster. Ill. by Kathleen Heiden.

Matter All Around You: A Book About Solids, Liquids and Gases by R. J. Lefkowitz. Ill. by Lawrence Di Fiori.

Light and Shadow by Carol Schwalberg. Ill. by Lawrence Di Fiori.

What is Science? by John M. Scott. Ill. by Jennifer Perrott.

Why Things Work: A Book About Energy by Jeanne Bendick. Ill. by Jeanne Bendick with Karen Bendick.

Picture Signs and Symbols by Winifred and Cecil Lubell. Ill. by Winifred Lubell.

The following facts apply to all of these books:

Published in 1972. Age level 7-10

(grades 2-4). 64 pp. \$3.78 per volume. Each has an Index.

The books are written in simple and clear language appropriate to the age level of the readers. They are copiously and appropriately illustrated by drawings printed in a single color over black-and-white. The illustrations frequently include figures of children, thus emphasizing the child's involvement with the phenomena described. The authors and illustrators are all of excellent qualifications and extensive experience in writing or illustrating children's books. The books raise questions not all of which are answered directly in subsequent sentences; thus the reader is challenged to answer them for himself. They tell about things to do, instead of just reading about them; a good example of this is the description of Galileo's experiments with the pendulum in *What is Science?* The child learns about such fundamental things as the types of buildings people live in, the symbols we use in communicating with each other, the role of matter and energy in our surroundings and our activities, and above all about how we learn about the world and about ourselves in it.

Ben Hall Does Reviews

We are pleased to announce that Dr. Benedict A. Hall, professor-emeritus at the State University of New York (Cortland College), has joined Robert McClung in the important work of reviewing the ever-increasing number of books published in the nature and environmental fields. Readers will find his reviews in this issue.

Ben Hall is a botanist with a wide interest in conservation and literature. He possesses a scientist's insight into the natural world and a fine sensitivity of written English. He has published articles in *NATURE STUDY* as well as in botanical journals.

Next Annual Meeting Set For February, 1974

In line with the new schedule for the annual meetings of AAAS, the next annual sessions of ANSS will be in San Francisco in February, 1974. The Christmas meetings, long a tradition, are no more.

AAAS will hold an interim meeting in Mexico City in June of this year. It was decided by the Board of Directors of ANSS not to participate in these meetings, but to wait for the next regular sessions in 1974.

Election of officers and directors has been delayed until early 1973. New officers will serve until the annual meeting in February, 1974.

NEWS and NOTES for Environmental Education . . .

Ken Hunt Quits Glen Helen

Dr. Kenneth W. Hunt, long-time ANSS member and biology professor and director of Glen Helen nature reserve at Antioch College, resigned both positions in an unexpected move on January 19, 1973. Dr. Hunt took this drastic action in support of a subordinate. Mr. Richard Hudgell, who was allegedly man-handled by the president of a striking union and employee of the Glen Helen preserve.

We sincerely hope that the problem will be resolved at Antioch, so that the important environmental education work at Glen Helen can continue. This nature preserve has set the trend in outdoor education for over twenty years. At a time when environmentalists are seeking ways to involve labor and business persons in environmental education activity, it is sincerely to be hoped that everyone will work together to achieve our common goals.

Ken is interested in possible full-time or part-time openings, either in teaching (botany, conservation) or nature interpretation, with perhaps time for photography and illustrated lecturing. Persons with leads should contact him at 1340 Rice Road, Yellow Springs, Ohio 45387.

Programs At The Center For Environmental Communications

An informal consortium of faculty and students from a number of University of Wisconsin-Madison departments have developed programs in environmental communications through existing Master's level degree programs at the University. What might be called the "environmental communications ecosystem" at the University of Wisconsin has five areas in which specialists are being prepared:

1. Mass communications media
2. Government agencies
3. Educational institutions
4. Resource industries
5. Eco-action organizations.

These programs provide a growing opportunity for journalists to turn manager-scientist with a communications bent. Students take their Master's degrees in established programs in the Department of Agricultural Journalism, the School of Journalism and Mass Communication, or in any one of the several departments of resource planning and management.

Qualified students work out a minor in environmental communications while taking degrees in these fields.

In a day when so much effort should be given to helping our adult citizenry as well as school children become environmentally enlightened, these interdisciplinary programs are of particular significance.

A.S.E.E. Announces First Annual Convention

In announcing the convocation of the First Annual Convention of the American Society for Ecological Education Dr. William L. Mayo, the organization's president, extended a cordial invitation to all governmental agencies concerned with the environmental issue, non-governmental organizations promulgating ecological awareness, and environmentalists to participate in the four-day meeting.

"The purpose of our First Annual Convention," Dr. Mayo said, "is not merely to discuss and to finalize internal matters. What we are really interested in and looking forward to, is exposure to opinions on all aspects of the environmental issue so that, from such an experience, we will be able to design effective programs for implementation in the school systems and in the public sector. For this reason, we invite the active participation, in our scheduled seminars, of delegations from all governmental environmental agencies, non-governmental organizations, and environmentalists. And we would welcome the presentation of papers by such participants."

The convention was held January 25 to 28, 1973 at Cedarcrest College's Fahkahatchee Environmental Studies Center, near Naples, Florida.

Roland Ross Fights For Pyramid Lake

Roland C. Ross, long-time ANSS member in California, is hard at work protecting the water rights of Paiute Indians against the demands of Reno, Nevada, and other cities for the waters of Pyramid Lake. The Indians have taken their case to the U.S. District Court in Washington, and Ross urges sympathetic persons to write to the U.S. Department of the Interior and Senators Cranston and Tunney to urge them to support the Indian cause.

Fazio Available

James R. Fazio, ANSS member from Fort Collins, Colorado, indicates that he will be available for a college-level teaching position in environmental education starting in June of this year. Jim has a Bachelor of Science degree in forestry from West Virginia University, and a Master of Professional Studies from the College of Agriculture and Life Sciences at Cornell University. He has had experience as an associate editor of a trade journal in forestry, and has done a good deal of writing in environmental matters. Persons with information regarding possible openings should contact Jim at 850 West Lake Street, No. 29, Fort Collins, Colorado 80521.

Another New Environmental Education Publication

The seemingly endless proliferation of new environmental education publications is illustrated by the appearance of the "Environmental Education Report," a new monthly newsletter devoted exclusively to environmental education. Charter subscribers are now being sought, at an initial subscription price of \$25 per year. Readers are promised that each month the *Report* will have eight news-packed pages with hardcore information on the following topics:

1. Informative interviews with leading environmental educators
2. Reviews of demonstration projects and pilot-programs
3. Environmental activities and projects undertaken by government agencies, trade associations and corporations
4. Ideas on funding sources for innovative environmental education programs
5. New publications, films, workshops etc.
6. Feature articles of pertinent interest to all environmentalists.

William J. Kardash is the publisher of this new monthly *Report*.

IUCN Endangered Wildlife Conference

The International Union for Conservation of Nature and Natural Resources (IUCN) is hosting a comprehensive intergovernmental conference, on the conservation of endangered wildlife, in Washington, D.C., February 12 to March 3, 1973. IUCN has had a long history in preparing materials on endangered species, including the famous and indispensable redbooks on endangered mammals.

mals, birds and other groups. It is hoped that all of the more than 100 countries which have been invited to participate will do whatever is necessary to send representatives to aid in the final drafting of the document to which many nations have already agreed in principle. It is hoped that the many species and subspecies of wildlife which are likely to become extinct unless action is taken will be protected by the international trade regulations which this Conference will develop.

AIN To Meet

The Association of Interpretive Naturalists is holding its annual meeting and workshop at the Lodge, Salt Fork State Park, Cambridge, Ohio, April 4-7 1973. These helpful workshops are held each year, and are widely attended by interpreters and educators from all kinds of private and public parks and agencies. Persons interested in attending these meetings should write to Mr. Donald R. Yeager, Publicity AIN/and Supervisor Interpretive Service, Monroe County Parks, 375 Westfall Road, Rochester, N. Y. 14620

Melvin Publishes Guide Book

Ruth Melvin, ANSS second vice president, has written "A Guide to Ohio Outdoor Education Areas," published by the State of Ohio Department of Natural Resources for the Ohio Academy of Science. This guide book is distributed free to all schools and school libraries, and presumably is available to other interested citizens. It might serve as a format for use by other ANSS members in their own states or provinces.

Book Exhibit A Great Success

The exhibit of books written by ANSS members grew into a really exciting display, due to the cooperation of authors and publishers. The thirty-three books submitted constituted a fascinating variety: from paperbacks to loose leaf to hard cover; from specialized topics like trees, birds, rocks, and minerals to broad topics like reading the landscape, ecology and city planning; from textbooks to trade books; from books stressing activities or content to philosophies; from books for children and/or teachers to books for naturalists and arm-chair explorers. It was a beautiful indication of the variety of interests that ANSS membership represents. (See list below.)

The exhibit was broken down after the Annual Luncheon for distribution to the guests as door prizes - but many persons donated their selection to the library of the Adams-Morgan Commun-

ity Nature Center, a store-front inner-city operation in a Black neighborhood of Washington.

The group was so excited by this fine exhibit that it was decided to put together a travelling exhibit to go from place to place, being used both to stimulate environmental education and to give a boost to our author-members. Helen Russell, who put together the Washington exhibit, will coordinate this travelling book display.

INVITATION TO AUTHORS

An invitation is hereby issued to all authors, editors, and illustrators who are members of ANSS to submit one or two books (or their modern counterpart, activity cards, cassettes, etc.) for a new display which will travel all year. We cannot exhibit more than two books from any author. You may, however, submit a personal bibliography listing all your titles.

At this time we have invitations to set up this display from the National Arboretum in Washington, from the Wave Hill Center for Environmental Studies in New York City, and from a teaching museum in Westchester County, N. Y. Other invitations are under consideration. If you have sites to propose, contact Dr. Helen Russell at 44 College Drive, Jersey City, N. J. 07305. She hopes to make this exhibit available to a number of places before the next ANSS meetings in San Francisco in February, 1974.

BOOKS ON EXHIBIT

Behnke, Frances L., *The Changing World of Living Things*, 1972, Holt Rhinehart Winston, Inc. 10 and up.

Betros, Harry, *Understanding Schoolyard Ecology*, 1972, Exposition Press.

Brainerd, John, *Nature Study for Conservation*, 1971, Macmillan Co. Adult.

Busch, Phyllis S., *Exploring As You Walk in The City*, 1972, *Exploring as You Walk in the Meadow*, 1972, Lippincott.

Case, Marshal T., *Look What I Found!* 1971, The Chatham Press. 10 and up.

Fischer, Richard, Editor, *Our Living World of Nature Series. Life of The Pond*, 1967. *The African Plains*, 1972. *Prairies and Plains*, 1967. McGraw Hill.

Gibbons, Euell, *Stalking the Good Life*, 1966, 1971, David McKay Co.

Jepsen, Stanley M., *Trees and Forests*, 1969, A. S. Barnes and Co. Adult.

McClung, Robert M., *Bees, Wasps and Hornets and How They Live*, 1971. *Lost Wild America*, 1969. William Morrow.

Melvin, Ruth, *A Guide to Ohio Outdoor Education Areas*, 1971, Pub. State of Ohio Dept. of Nat. Resources for Ohio Academy of Science.

Munzer, Martha E., *Planning Our Town*, 1964, Alfred Knopf.

Pough, Richard H., *Audubon Water Bird Guide*, 1951, *Audubon Land Bird Guide*, 1946 *Audubon Western Bird Guide*, 1957. Doubleday.

Rockcastle, Verne N. (and Schmidt Salomon and McKnight), *Elementary School Science: Elementary, Intermediate*, 1972. Addison-Wesley Publishing Co.

Rosner, Joan, Editor, *Teachers Manual to Accompany A Place To Live*, 1970. National Audubon Society.

Russell, Helen R., *Small Worlds: A Field Trip Guide*, 1972, Little Brown. *Winter Search Party*, 1971. Thomas Nelson.

Schreider, Herman and Nina, *How Your Body Works*, 1949, 10th Printing, 1966. *Rocks, Rivers and The Changing Earth*, 1952. William R. Scott.

Schultz, Beth and Marcuccio, Phyllis, *Looking Into Earth's Life Systems*, 1972. Charles E. Merrill Publishing Co.

Selsam, Millicent, *The Tomato and Other Fruit Vegetables*, 1970. *Vegetables From Stems and Leaves*, 1972. Morrow Junior Books.

Vinal, Cap'n Bill, *Nature Recreation*, 1940, 1963. Dover Publications. Adult.

Watts, May Theilgaard, *The Master Tree Finder*, 1963, *The Nature Study Guide. The Landscape of Europe*, 1971. Harper Row.

Wharton, Mary E. (and Barbour, Roger W.), *A Guide to the Wildflowers and Ferns of Kentucky*, 1971, University Press of Kentucky. Adult.

Zim, Herbert, *Rocks and Minerals*, 1957. Western Publishing Co. *A Guide to Field Identification of Birds of North America*, 1966, Western Publishing Co., *Weather*, 1957, 1965 Western Publishing Co.

Field Trip at Annual Meeting

The last day of the ANSS meetings in Washington was spent in the field. Twenty-six participants began the day with a visit to Chesapeake Bay Center for Environmental Studies. The 2,000-acre center with 14 miles of shoreline on the Rhode River (a brackish arm of the Chesapeake River) is owned by the Smithsonian Institution. We learned from staff members that the Smithsonian

along with John Hopkins University, the University of Maryland, and the Virginia Institute of Marine Sciences, is a member of the Chesapeake Research Consortium which promotes and coordinates the research for the total Chesapeake area.

Lunch was eaten aboard our chartered bus as it bolted along the highway. It consisted of chicken and apple pie salvaged by the ecologically-minded Russells from the previous day's luncheon.

The group was joined after lunch by Evan and Ives Hanay who led a bird walk to Sandy Point State Park and Kent Island. Though rain threatened all day the water birds and views of the Chesapeake made it all worthwhile. Twenty-three species were seen. They were: Horned Grebe, Pied-billed Grebe, Great Blue Heron, Whistling Swan, Canada Geese (lots of seat in parking fields), Black Duck, Canvasback, Scaup, Goldeneye, Bufflehead, Oldsquaw, Red-shouldered Hawk, Ring-billed Gull, Rock Dove, Blue Jay, Crow, Carolina Wren (singing), Mockingbird, Starling, Myrtle Warbler, Redwing Blackbird, Cardinal, and Song Sparrow.

C. M. PESSINO

STEP

Continued from page 9

quired approaches. It does offer specific advice on how to organize and move ahead, and where to turn for assistance.

Though local in application, STEP is co-sponsored at the national and international levels by the U.S. National Park Service and the U.S. National Commission for UNESCO. Both agencies stand ready to help you start and carry out a STEP program.

The development of each STEP program is divided into two phases. During the first phase, the National Park Service provides an informal, ten-hour program for STEP volunteers, to help them develop environmental awareness and sensitivity and to see themselves as part of the total web of life. During the course, they learn how to set up an Environmental Study Area (ESA) in any urban, suburban, or rural area, and to demonstrate basic, universal environmental principles to elementary school students by guiding them through the ESA. This orientation and training normally takes place on weekends, rather than during school hours.

STEP participants (including adult counselors) who successfully complete the ten-hour program receive a certificate attesting that they are officially members of STEP, qualified to provide ESA training to elementary school students, and to move into the second phase of STEP — the initiation of action pro-

jects for tackling local environmental problems.

The U.S. National Commission for UNESCO provides information and advice on how to conduct an environmental survey of the community and to identify significant environmental problems where to look for information and advice, how to win support in carrying out those projects selected for action, and how to assure local and national recognition for outstanding successes. (For example, individual STEP members and groups who carry out successful projects will receive advice and assistance in qualifying for recognition under the President's Environmental Merit Awards Program.)

To start a STEP program in your high school:

Discuss the STEP program with your principal and get his approval to proceed. (The national co-sponsors can help you win the endorsement of higher authority, if necessary, of appropriate educational associations.)

Publicize the possibility of a STEP awareness/action program in your high school to all students.

Set a time and place for a meeting of all students and staff who might be interested in starting a STEP program.

List those who agree to take part in the ten-hour program and to guide elementary school students through an Environmental Study Area on a voluntary basis.

Ask the group to elect a student coordinator (or whatever they choose to call the student thus selected) to work as your liaison with students in getting the program started, and a secretary to keep a record of all decisions reached by the group.

Then write to:

STEP
Post Office Box 19325
Washington, D.C. 20036

Be sure to include your name, title, business address, full name and address of your high school, number of students enrolled in your school, and the number who have agreed to undertake the ten-hour program and to share their environmental knowledge and experience with elementary school pupils thereafter. (The number who get wholeheartedly involved in a high school STEP program is usually small at the beginning and grows by word of mouth as the program proves its value. Your initial listing may be only five to ten names long.) Mention any special problems, and note any special environmental interests expressed by prospective participants. Above all, don't hesitate to ask questions on any aspect of the program that puzzles or concerns you.

Outdoor Recreation Is Not New

Outdoor recreation is not new. The youngsters of ancient cave dwellings often descended to the valley streams to wade or swim, or perhaps to bring home some fish, or crawdads or even frog legs for the family meal. The dwellers of ancient forests may have climbed some knoll to gaze in awe at a distant storm or to watch a brilliant sunset. These people were geared to the outdoors. Many millennia of such life made them psychologically and genetically fitted to the wilderness around them. Theirs was a life which had no need to develop a fitness for intense urban crowding.

Yet man in early days, in the dawn of history, did gather into communities, but this was largely for protection. Yet he did not lose contact with the fields where he went to care for and harvest crops; where he grazed his domesticated stock; nor did he fail to go to the distant hills to snare wild game to supplement his meager fare gathered from his fields and flocks.

Scarcely a generation ago there was a rare child in America who didn't have grandparents, uncles and aunts or other relatives who lived on a farm where periodic visits were made. On these visits the local fields, woods, streams and meadows were explored. There was an identity with nature re-established which was a stimulating experience. This gave an outlet to pent up psychological and often misunderstood longings. This brought man's basic outdoor nature built through thousands of years to a sense of satisfaction and spiritual uplift.

Outdoor recreation is not new. What is new are the vast problems raised by the immense crowds seeking outdoor experiences. The outdoors attracts them, but their years of being penned up in endless rows of houses of modern megalopolis has not given a skill in gaining meaning from the outdoor experience. They hear sounds, but these have no meaning. To them deep woods seem silent when in truth the insects, birds and mammals and the storm blowing through the tree tops all tell a story to the ear attuned to nature.

Man longs for interpretation of the out-of-doors, perhaps vaguely. He may not understand clearly these longings, subdued by the sheen and vulgarities of civilization that have dulled his sensitivity. Rachel Carson in her *Sense of Wonder* pleads for youngsters to be given the opportunity to exercise this sensitivity. Her book is highly recommended.

Nature Study

The journal of the American Nature Study Society

Editor: STANLEY B. MULAIK, 1144 E. 3rd So., Salt Lake City, Utah 84102.

Associate Editor: JOHN A. GUSTAFSON, R. D. 1, Homer, N. Y. 13077.

Officers: President: Kingsley L. Greene, 48 Sullivan St., Cazenovia, N. Y. 13035

First Vice-President: Helen Ross Russell, 159 Orient Ave., Jersey City, New Jersey 07305.

Second Vice-President: Ruth W. Melvin, 8535 Winchester Rd., Carroll, Ohio 43112.

Secretary: Mrs. John Geisler, Milewood Rd., Verbank, New York 12585

Treasurer: John A. Gustafson, R. D. 1, Homer, New York 13077

Representative to AAAS: John A. Gustafson, R. D. 1, Homer, New York 13077

Historian: Ralph W. Dexter, Kent State University, Kent, Ohio 44240

Directors: Class of 1972:

Dean Bennett, Yarmouth, Maine 04096

Richard L. James, Schuylkill Valley Nature Center, Hagy's Mill Rd., Philadelphia, Pa. 19128

Donald R. Lambert, RFD 2, Moulton Hill Rd., Monson, Mass. 01057

Richard E. McBride, Division of Education, State University College, New Paltz, N. Y. 12561

Class of 1973:

Richard J. Baldauf, Department of Wildlife Science, Texas A & M University, College Station, Texas 77843

Phyllis S. Busch, Conklin Hill Rd., Stanfordville, N. Y. 12581

Richard F. Fleck, 912 Mitchell St., Laramie, Wyoming 82070

Adele N. Wilson, 2400 Virginia Ave., N. W., Washington, D. C. 20037

Herbert S. Zim, Box 34, Tavernier, Florida 33070

President, Western Section:

Dorothea Mulaik, 1144 E. 3rd So., Salt Lake City, Utah 84102

NATURE STUDY is published quarterly in March, June, September and December by the AMERICAN NATURE STUDY SOCIETY, and is sent to all members and subscribers. *Deadlines for copy:* January 25, March 25, June 25, September 25.

Concerning subscriptions, change of address, and membership: address the treasurer.

Concerning requests for back issues, TIPS, and other information: address the secretary.

Concerning manuscripts, notes, letters for publication, and membership news: address the editor.

Reprints of articles may be obtained within six weeks after publication by placing order with the editor. Cost of reprints is \$4.00 per page for 100 copies and \$1.00 per page for each additional hundred copies.

The opinions expressed in this publication are those of the authors. Articles may be reprinted provided credit is given.

AMERICAN NATURE STUDY SOCIETY

Mrs. John Geisler, Secy.
Milewood Rd.
Verbank, New York 12585

John J. Padalino
Mill Road
Dingman's Ferry, Pa. 18328

Non-Profit Organization

U. S. Postage
PAID
Indiana, Penna.
Permit No. 200

ADDRESS CORRECTION REQUESTED

ANSS Joins Alliance

At the annual meetings in Washington, the ANSS Board of Directors voted to join the Alliance for Environmental Education, a new group forming to bring together the various national organizations involved with environmental education. The Alliance hopes to be able to coordinate the activities of these many organizations, and to have sufficient financial strength to hire an executive director. At the present time William Lynch is serving as interim executive director during the formative stages.

The formation of this Alliance brings about a long-term goal which ANSS has supported, namely a joint national vehicle to focus private organizational efforts in environmental education.

The American Nature Study Society

Invites you to join us in promoting Environmental Education

Send in this membership form to J. A. Gustafson, R. D. 1, Homer, N. Y. 13077.

<input type="checkbox"/>	SUSTAINING MEMBER	\$ 5.00
<input type="checkbox"/>	FAMILY MEMBERSHIP	\$ 8.00
<input type="checkbox"/>	CONTRIBUTING MEMBER	\$10.00 up
<input type="checkbox"/>	STUDENT MEMBER	\$ 3.00
<input type="checkbox"/>	LIFE MEMBER	\$100.00

All members receive NATURE STUDY and the KANSAS SCHOOL NATURALIST quarterly.

Name

Address

Zip

(Membership in ANSS is tax deductible)