

The Cary Arboretum



of The New York Botanical Garden

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Deer Management Studies at the Arboretum, 1976-1983

by Robin Parow-Place

When the Cary Arboretum's deer research program began in 1976, it was designed with two primary goals: to develop integrated deer management techniques and to provide recommendations on cost-effective methods for dealing with deer damage. During the past six years, hundreds of fruit growers, nurserymen, and homeowners have benefited from this research, and countless others will benefit in the future as a result of a public outreach program designed to provide aid to those seeking relief from deer damage to their property.

That such a research program would evolve to provide spokespersons for deer damage control in the Northeast is not surprising. Once initial information from the Arboretum was available, the demand for solutions to deer control problems in New York State apple orchards alone, where thousands of dollars in damage are sustained annually, seemed reason enough to broaden the alternatives of deer control — for agriculturists as well as rural homeowners. Under four categories of study: physical barriers, repellents/deterrents, habitat management practices, and deer population management, Arboretum researchers have sought ways to reduce deer damage.

The Arboretum's own deer population served as a research base for initial studies of deer damage control. A deer tagging program was initiated in 1976 and continued through 1980, enabling the Arboretum's Wildlife Department staff to collect data on deer movement, social organization, and herd dynamics. This effort was accomplished with extensive trapping and a marking system utilizing color-coded collars and ear streamers that quickly identified individual deer. Conclusions from this study and others validated the need for development of a controlled harvest program designed to maintain the deer population at a level compatible with Arboretum land use. The control program also included the use of habitat management practices, repellents, and fencing. This was the Department's initial step towards "customized control" — a long-term, cost-effective control plan designed to fit the needs of a site and to suit those who used the land.

Physical Barriers

A slanted, two-dimensional outrigger fence used at the Arboretum in 1977 proved to be much more effective in controlling deer than traditional electric fences. With assistance the following year from fence manufacturers, an elaboration of the 1977 fence, utilizing fencing components from New Zealand, was put into use in the Arboretum's research field where valuable woody plants were especially vulnerable to browsing deer. This version of the fence sloped from a height of four feet on the outside to ground level inside, creating an overhang six feet wide that deer could not jump, although there were occasional attempts by deer to break through to reach the field of seedlings inside the fence. This improved version of the slanted fence reinforced the concept of a physical barrier by combining a safe, yet effective, electrical shock with a high tensile wire more durable than the wire first used. Unlike the fence previously used, 18-inch springs built into the fence line added a new feature and increased the ability to support a significant amount of weight without bending or stretching, and decreased the overall cost since maintenance, time, and materials were sharply reduced. Proven highly effective in protecting areas from deer damage, it was determined that this design would be most appropriate for use in large areas under high deer pressure. Variations on this high tensile fence have been developed and tested for use in smaller areas, for areas where deer pressure is moderate, and in areas where control of raccoons, woodchucks, and rabbits is needed also.

Repellents and Deterrents

One of the most unique deer repellents investigated by Arboretum researchers, and one that has been extremely newsworthy in the Northeast and throughout the country, is the "hairball." Inexpensive and especially appealing to those who choose to take a totally organic route in deer control, the hairball is a double-fisted ball of human hair wrapped with mesh netting. Suspended from branches of trees and plants, this barbershop waste, when applied twice yearly, has proven to be effective in repelling deer.

Dr. Elias Makes History in Southern Siberia



Dr. Thomas Elias, left, with a group of American and Soviet botanists during a collecting expedition in the West Sayan Mountains in the Tuva Autonomous Republic.

Arboretum Assistant Director Dr. Thomas Elias this summer became the first American citizen ever to visit the Sayan Mountains in the Tuva Republic in Southern Siberia as part of a continuing botanical exchange program between the U.S.A. and U.S.S.R.

A Soviet photographer and journalist documented extensively the work of Dr. Elias and his two American associates as they made the historical expedition to collect plant specimens. An in-depth photo essay on the three-man American team will be published later this year in *Soviet Life*, an English-written Soviet publication similar to *Life* magazine.

The flora of the Sayan Mountains, part of the Tuva Autonomous Republic located just north of Mongolia, is very similar to that of the American Rockies and parts of Alaska. All three of these areas contain more than one hundred of the same or closely related botanical species, giving proof that such plants were once more widely spread over vast areas in past geological history. Examples of such species are alpine gentian (*Gentianaceae*), dwarf birch (*Betula rotundifolia*), marsh marigold (*Caltha palustris*), dogtooth violet (*Erythronium*), and wild columbine (*Aquilegia sp.*).

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Prerequisite to management: a deer trapping and tagging program initiated in 1976 provided insight to deer characteristics and feeding patterns.

With support from the New York Department of Agriculture and Markets, the Wildlife Department staff has been involved in a commercial deer repellent testing program. Cooperation from repellent companies and Hudson Valley apple orchardists has led to the most recent investigation of seven different products, which contain primary ingredients ranging from putrescent egg solids to ammonia. These repellents are being tested on 900 trees throughout the Hudson Valley on eighteen 50-tree orchard plots. Based on the results of these tests, recommendations are being made to the growers. The cost of implementing repellent spray projects is being assessed in order to determine the cost-effectiveness of the total program. Recent test results indicate that for large acreages, machine spray procedures can be cost-effective if applications do not exceed four to six per year. When more than six applications are required to keep damage at economically tolerable levels, growers should reconsider repellents as a control option and look to fencing instead.

Habitat Management Practices

Habitat management practices are used in conjunction with other deer control techniques and involve eliminating deer food and/or cover from areas where deer damage

problems must be decreased. By studying deer travel patterns and feeding habits, it is evident that areas containing high-growing vegetation (similar to that found in overgrown fields), along with browsing material consisting of woody plants and trees, tend to attract deer or provide them with cover necessary for their continued presence. Thus, by eliminating these features or by using them to attract deer away from sensitive areas, deer damage can be reduced. Habitat management practices are generally applied in concert with other control techniques. This integrated approach is required in order to accommodate yearly and seasonal changes in deer pressure.

Population Management

The Arboretum's deer population management or "herd reduction" program has an interesting history. From the beginning, it has served as a necessary and effective tool in reducing the Arboretum's resident herd to lessen deer damage to plants and trees, and in ensuring that the remaining herd would be healthy as a result of having the proper amount of forage required during the winter.

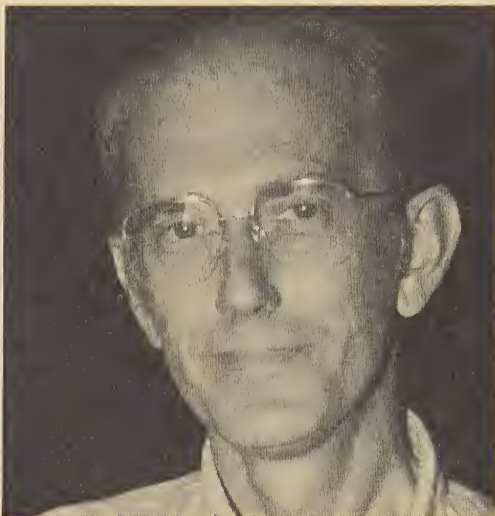
The program involves a selection process that includes removing older aged deer (who require more forage) and especially older females (potential bearers of twins or triplets). Hunters are required to take shooting proficiency tests, attend a pre-hunt seminar, and sign in and out of the Arboretum grounds during hunting season. They cooperate with the Arboretum staff by bringing deer to a wildlife check station where body weight, age, and condition of the deer are determined. Such data have proven to be useful in assessing the quality of the herd. Since the initiation of the Arboretum's population management program, the overall health of the herd — a direct reflection on the quality and quantity of vegetation on the range — has improved substantially. This result is obtained by determining the minimum number of hunters required to meet carefully calculated harvest objectives. Hunting pressure is equitably distributed throughout hunt portions of the Arboretum by well-placed parking areas.

By using physical barriers, repellents/deterrents, habitat management practices, deer population management, or any combination thereof, deer damage is being reduced where it has historically been a perplexing problem. The core of Arboretum researchers which considers it their responsibility to educate concerned citizens on the results of their studies consists of Arboretum Coordinator of Wildlife Resources Jay McAninch, Natural Resources Manager Ray Winchcombe, and Research Associate Mark Ellingwood. Each is strongly dedicated to a public outreach effort that has produced three informational booklets: *High-Tensile Wire Fencing*, funded by the Northeast Regional Agricultural Engineering Service; *Deer Damage Control in Orchards and Vineyards in New York State*; and the latest publication, available this autumn, *Deer Damage Control in New York Agriculture*, both the latter funded by the Department of Agriculture and Markets. In addition, the three staff members have traveled extensively throughout the Northeast to speak with and assist countless agriculturists, sportsmen, homeowners, and others in controlling deer.

There is no single solution to deer damage problems, but individual and combined control techniques have proven to be successful in eliminating or reducing deer damage in the Northeast. With continued support and assistance from the Department of Agriculture and Markets, the Arboretum's Wildlife Department will expand its deer control research to include a wide array of agricultural commodities, including nurseries, Christmas tree farms, and other cash crops.

The three Arboretum Wildlife Department staff members, serving as the driving force behind such research and networking, are quick to give credit to Arboretum volunteers, students, Members, and neighbors who have made such work possible, as well as organizations, corporations, and public agencies that have contributed support — both financial and informational — during the past six years. Without them, the deer damage research program could not have provided the quality program which has brought it respect and notoriety during the past six years.

John Eaton Joins Staff



John Eaton

John Eaton, a forest ecologist whose research has focused on the cycling of nutrients within the forest ecosystem, has joined the Institute of Ecosystem Studies (IES) staff and

is setting up office and laboratory facilities in the Plant Science Building.

A native of Keene, New Hampshire, Mr. Eaton holds degrees in forestry and forest pathology from the University of New Hampshire and Yale University. He served in the U.S. Army's personnel administration in Germany from 1961 to 1963, and upon returning to this country worked as an Extension forester for the State of New Hampshire.

During the late 1960's Mr. Eaton became interested in a research project at Dartmouth College where investigations of the flow of nutrients and energy through a forest ecosystem were underway. He soon joined the founders of that project, Dr. Gene Likens and Dr. Herbert Bormann. The program was relocated to Cornell University and Yale University, and together the three continued to develop a research philosophy that within ten years would be world-renowned. This program is known as the Hubbard Brook Ecosystem Study.

Hubbard Brook is the main drainage stream from a 3,000-hectare (7,500-acre) watershed

in the White Mountain National Forest in New Hampshire, an area originally set aside in the 1950's for watershed/hydrologic studies. The Hubbard Brook Ecosystem Study has been funded throughout by the National Science Foundation. This research has evolved to not only include studies of the Hubbard Brook system, but its environs, including surrounding forest areas and the atmosphere. The approach to understanding the complete ecosystem surrounding Hubbard Brook was a holistic one — one that set the stage for similar research both in the U.S. and the world.

While involved in the Hubbard Brook project, John Eaton has resided in Dryden, a small town near Ithaca, for the past 14 years and has conducted analytical work on the project at Cornell University.

Mr. Eaton was the first of several IES staff members to arrive at the Arboretum in preparation for the arrival this month of Dr. Gene Likens, IES and Arboretum Director, and Vice President, NYBG. On-going re-

Difficult-to-Obtain Woody Plants Available

Woody plants rarely found in commercial nurseries are currently available through the Arboretum's Gifford House Gift and Plant Shop, Route 44A.

According to Arboretum Horticulturist Robert Hebb, the specimens were selected from those planted on the Arboretum grounds that proved to have special or unique qualities. "We are pleased to make these available to the public," he said, adding that this is the first of many years he hopes to provide gardening and landscape enthusiasts the opportunity to grow such difficult-to-obtain plants.

The following specimens, which range in price from \$5.00 to \$6.50, are in six-inch pots and will be available through late autumn:

FORSYTHIA VIRIDISSIMA 'BRONX-

ENSIS': A forsythia developed at the New York Botanical Garden, this plant is noted for its dwarf habit of growth. It makes a small mound, never over 2½ feet in height and almost a yard wide. In spring it flowers profusely with handsome, light-golden blossoms. Grow it as a single specimen or as a low hedge.

BLACK PUSSY WILLOW (SALIX GRACILISTYLA 'MELANOSTACHYS'): An unusual and beautiful pussy willow. This plant is impossible to obtain from nurseries. In early spring it produces a profusion of nearly black flowers. As these mature, the red flower parts provide exceptional contrast. The plant forms a small dense bush, never much more than 4 feet in height and width, and is suitable for growing in moist or ordinary soils.

JAPANESE FANTAIL WILLOW (SALIX SACCHALINENSIS 'SEKKA'): An extraordinary willow. Many of the growths consist of fasciated or beautifully contorted stems which are superb in winter floral arrangements. Forms a large dense bush ultimately 15 feet in height with a similar spread. Suitable for damp or ordinary soils.

ORIENTAL SAWTOOTH OAK (QUERCUS ACUTISSIMA): A rare Japanese tree which grows to a height of 60 feet and has wide spreading branches with particularly handsome foliage and bark. This plant has relatively rapid growth and is unobtainable from nurseries. The Arboretum's Gift and Plant Shop is open Monday through Saturday, 11 a.m. to 4 p.m., and Sunday, 1 to 4 p.m.

People at the Arboretum



Mark Ellingwood

Mark Ellingwood, Wildlife Research Associate . . . one of three Arboretum Wildlife Department staff members whose responsibilities include informing the public on deer control techniques (see related story, page 1), Mark finds his work challenging and vital to northeastern agriculturists and homeowners who require advice on deer management practices.

Mark received a B.S. degree in Natural Resources from the University of Connecticut in 1978 and a Master's degree in Wildlife Management from West Virginia University in 1982. He first visited the Arboretum with a group of college students in 1977, and while earning his B.S. degree, worked on a school-sponsored research project at the Arboretum under the supervision of Jay McAninch. He later went on to volunteer several hundred hours of work on various Wildlife Department projects and was an Arboretum employee for two years prior to pursuing his Master's degree.

A Millbrook resident, Mark grew up in a suburban Connecticut community. As a result of a variety of family-shared recreational hobbies, at an early age he showed interests in wildlife and the environment, and although his parents, sister, and two brothers tended towards business-related fields, he felt comfortable with his decision to make environmental studies a career.

Beyond the actual field work and research involved in developing deer control techniques, Mark especially enjoys relating such information to the general public, other wildlife professionals, and agriculturists in need of assistance in dealing with deer damage. Throughout the Northeast, Mark and other Wildlife Department staff members provide solutions to individual deer damage problems plaguing those with land ranging in size from just a few acres to large parcels used for cash crop farming. "It is very gratifying to provide people in need with helpful advice and information," he says; "communicating this information allows us to apply the results of our research in a practical and meaningful fashion."

Mark spends much of his leisure time involved in outdoor activities such as jogging, golf, cross-country skiing, fishing, and bow hunting. One of his favorite pastimes is playing the five-string banjo.

Mark looks forward to continued deer research projects at the Arboretum, and as the Arboretum begins to develop as the prestigious Institute of Ecosystem Studies, he expects that continued investigations will expand to include deer behavior and herd dynamics in agricultural areas. Such direction, he feels, will lead to the level of understanding required in order to resolve serious conflicts between wildlife and land use, both on the Arboretum grounds and throughout the United States.

Dr. Likens Receives Award from American Water Resources Association

Dr. Gene E. Likens, Institute of Ecosystem Studies and Cary Arboretum Director, and Vice President, New York Botanical Garden, has recently been selected as the recipient of the 1983 Honorary Membership Award from the American Water Resources Association.

Well-known for his research on the biogeochemistry of natural systems, Dr. Likens is a founder of the internationally recognized Hubbard Brook Ecosystem Study, which has become the model for ecological and biogeochemical research throughout the U.S. and the world. Biogeochemical research involves forest practices designed to allow scientists to monitor water quality, soil fertility, forest growth and other ecological factors. The Hubbard Brook and surrounding 7,500-acre area of the White Mountain National Forest in New Hampshire have been the focus of Dr. Likens' 20-year study on nutrient cycling and the effects of acid rain on the forest environment.

According to Mr. Melvin W. Anderson, President, American Water Resources Association, the Honorary Membership Award was established in 1970 to recognize with eminence those involved in water-resources science and technology. "Dr. Likens' outstanding record of accomplishments in the water-resources field are known to all who practice in water resources today," he said; "his works have been of great value to many throughout the world."

Dr. Likens, who this month began setting up his laboratory and office in the Arboretum's Plant Science Building, will be responsible for developing an ecological education and research program whose goals are to advance the science of ecology and contribute to the clarification of public policy in this critical area.

DR. ELIAS

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Accompanied by Stan Shetler of the Smithsonian Museum, Washington, D.C., and David Murray of the University of Alaska at Fairbanks, Dr. Elias collected nearly 5,000 plant specimens that will become part of the Arboretum's herbarium collection. In addition to collecting specimens that will serve as comparative samples to better understand relationships between plant communities of the Sayan Mountains, Rocky Mountains, and Alaska, Dr. Elias collected woody plant specimens that will become re-

for his next book, *Trees of the Soviet Union*, scheduled for publication in 1985. Funded by a grant from the National Science Foundation, this will be the first English-language book on trees of the U.S.S.R.

This expedition was the seventh in a botanical exchange program under the authority of the USA/USSR Agreement on Cooperation in the Field of Environmental Protection, arranged through the U.S. Department of In-

Sixth Annual Fall-for-All Slated

The Cary Arboretum's Fall-for-All festival, a celebration of the autumn harvest enjoyed by thousands over the past five years, is slated for Sunday, October 2, noon to 5 p.m., on the Gifford House grounds, Route 44A.

Continuing the Fall-for-All tradition of

Around the