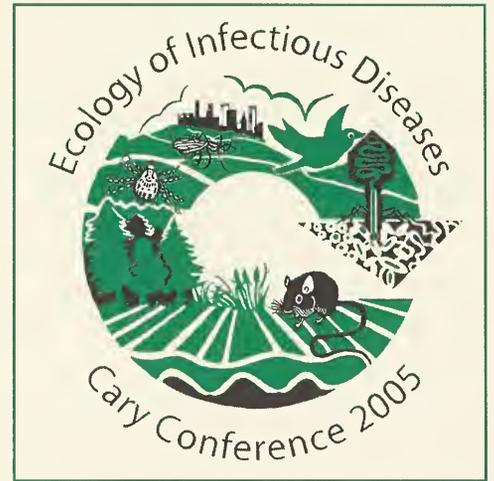




Employing Ecology to Predict and Manage Emerging Infectious Diseases

Last month, over 80 distinguished scientists from around the world gathered at the Institute of Ecosystem Studies (IES) to participate in a conference on infectious disease ecology. From West Nile Virus and Ebola to Sudden Oak Death, emerging infectious diseases threaten human health, wildlife, livestock, agriculture, and forests. Once established, infectious diseases are economic and ecological burdens that can cause, in some cases, irreversible damage.



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Editor's Note

From the flowers in the Gifford Garden to the influx of new faces, signs of summer are cropping up all over the Institute's campus. This year's Research Experiences for Undergraduate Students are busy settling in for three months of focused ecological research. The program immerses students in hands-on research, with topics including the ecology of the Hudson River, Lyme disease, and forest health.

June also marks the start of a new IES program, Research Experiences for Teachers. Three middle and high school science teachers will fine-tune their ecological understanding through intensive research projects on the Hudson River, in old fields in Dutchess County, and in the White Mountains of New Hampshire.

The warm weather also brings a number of unique continuing education courses. Upcoming offerings include *Landscape Painting at Wethersfield and Innisfree* (July 23) and *Organic Flower Gardening and Pest Control* (July 24).

The *IES Newsletter* is published by the Institute of Ecosystem Studies, located at the Mary Flagg Cary Arboretum in Millbrook, New York.

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Understanding, and ultimately preventing, emerging infectious disease depends on dialogue among professionals on the front lines. The Institute's 3-day conference, convened by Drs. Richard Ostfeld (IES), Felicia Keesing (Bard College and IES), and Valerie Eviner (IES), provided a cross-disciplinary forum for ecologists, medical doctors, veterinarians, and epidemiologists. Participant Dr. Sarah Randolph of Oxford University commented, "The conference facilitated invaluable conversation and collaboration among a diverse pool of scientists that share questions of common interest."

An underlying theme throughout the conference was the need to incorporate ecological methods into traditional epidemiological studies. Participant Dr. Andy Dobson, an ecologist at Princeton University, noted, "When trying to unravel the infectious diseases of plants and animals, the microscope of ecologists can provide just as much information as the microscope of microbiologists, veterinarians, and physicians. Infectious diseases exist within an ecological context."

Traditionally, infectious disease has been viewed as a problem that is best addressed through the use of vaccines or drugs. The diverse group of experts attending the conference explored the role of disease within a big-picture framework— considering the ecological context in which disease epidemics arise, and the consequences of disease in ecological systems. One of the main topics discussed at the conference was how ecological systems influence disease dynamics.

Consider Lyme disease. The pathogen that transmits infection to humans is regulated by the presence of blacklegged ticks, deer populations, and small mammal diversity. Managing diseases with complex lifecycles, where pathogens infect multiple host species,

requires an understanding of the ecological conditions that promote or inhibit disease. Dr. Felicia Keesing, one of the conference's organizers, commented, "Three quarters of emerging diseases – AIDS, Marburg, Avian Flu, etc. – arise in animals, and people become unwitting victims. We need to study disease dynamics in those animal populations."

Animal populations and the diseases they harbor are strongly influenced by environmental changes. Over the past several centuries, the progression of human society has dramatically altered the ecological landscape. From large-scale land modification to the global movement of people, animals, and plants— very few ecosystems can be considered remote or pristine. These environmental changes can enhance or inhibit the development of certain diseases.

The conference also explored how ecological methods and perspectives could be used to advance our ability to both manage and predict infectious diseases in humans, wildlife, natural plant communities and agriculture. Dr. Sharon Deem, a veterinarian at the Smithsonian Institution, noted, "Incorporating ecological approaches into the infectious disease framework will strengthen our ability to respond to emerging pathogens."

This sentiment was reinforced by Whirling Disease Foundation virologist Dr. Karl Johnson, co-discoverer of Ebola and Hantavirus, "Our planet is supporting a population of 6.5 billion, with a projected 9.1 billion in 2050. As borders and ecological boundaries shrink, the divide between theoretical ecology and applied epidemiology is also shrinking. Successfully

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Nurturing Plants, Growing Friendships

Volunteers provide invaluable support to the Institute's programs. This past year, 166 volunteers donated over 7,722 service hours to IES. While the jobs performed by volunteers are diverse, from assisting school programs to managing weeds in the Gifford Garden, volunteers share a common quality—a desire to make IES a better place.

Each volunteer has a unique story about how he or she found IES and what motivated them to give their time to the organization. Faith Lathbury and Ruth Melton, ages 95 and 93, have been tending to plants in the IES greenhouse since 1987. Nearly two decades ago, the women, both residents of the Fountains in Millbrook, were drawn to the Institute by a passion for plants.

Under the direction of Greenhouse Manager David Bulkeley, their capable hands have been potting and propagating plants ever since. Recently, I met with Ruth and Faith to discuss what IES volunteering has meant to them. As luck would have it, David was visiting Ruth and joined our leisurely lunch. Before dessert was served, one thing was clear—IES gave the women more than an outlet for their green thumbs, it fostered strong and enduring friendships.

How did you discover your mutual botanical interest?

Faith: Ruth and I both have summer cottages.



(L-R) Ruth Melton and Faith Lathbury have been propagating and pruning plants in the IES Greenhouse for nearly two decades.

My cottage is in Maine and hers is in New Hampshire. During Ruth's first year at the Fountains, in 1986, we decided to carpool between our cottages. The trip provided plenty of room for conversation, and gardening was a frequent topic. It was then that we realized that we shared a love of plants.

At that time, what were you doing to engage your botanical interests?

Ruth: When I came to the Fountains I brought several flora carts with me. These are large fluorescent-lighted carts with several levels of trays for indoor plant propagation and seed starting. They can be used to grow pretty much anything, from African violets and orchids to succulents.

Faith: Before moving to Millbrook, I had taken botanical classes at the Barnes Foundation in Pennsylvania. The courses, which focused on gardening, were taught on the property's arboretum. When Ruth arrived at the Fountains she invited me to work on her flora carts. We both really enjoyed that, but were interested in another gardening venue.

When did you decide to come to the IES Greenhouse?

Faith: At the time, it was still called the Cary Arboretum! We knew we loved plants and the arboretum seemed like a perfect place to find volunteer work. The greenhouse was particularly attractive because we could work there year-round.

Ruth: On our first trip to the greenhouse, we immediately realized that it would be a wonderful place to become involved with. It was just bursting with beautiful plants. Our first mission was to convince David that we would be suitable volunteers. Ruth had been active in gardening clubs; I had been a New York State Horticultural Judge and the President of the Scarsdale Gardening Club.

Faith: Based on our experience and enthusiasm, David said he could use our help. He's never run out of things for us to do!

What do you do at the greenhouse?

Ruth: It feels like we've done a little of everything! In the beginning, we did a lot of plant grooming. Given the number of plants at the greenhouse, something is always in need of tidying up. It takes a lot of time and hands to keep all the plants healthy. Over the years, we have shifted our efforts to plant potting and propagation.

Faith: Potting is great because it lets us focus our energy on one spot. It's also something that I can do well, despite having lost most of my sight. After working together for so long, Ruth and I have developed a system. One of us is potting while the other is clipping, we accomplish a lot with our time.

Ruth: It's so satisfying to see the flats of plants pile up at the door, and to know that it is a direct result of our efforts. The plants that we pot and propagate will wind up making others happy. Some are displayed at the greenhouse; others are given away at staff functions or sold in the IES plant shop.

Tell me what it's been like working for Dave?

Faith: David is one of the fairest bosses I have ever worked for. He has remarked to us, many times, that he could never manage a greenhouse of over 2,000 plants without the helping hands of volunteers. I've also overheard him say that he has two of the best potters in the county working for him—comments like this mean so much to me.

Ruth: At this point, David is like family to us. From sharing his knowledge of plants to surprising us with cakes on our birthdays, working with him in the greenhouse has been very rewarding.



Faith Lathbury teaching the finer points of plant potting to Garrett Diaz.

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Employing, *continued from page 1*

addressing the infectious diseases of the future will require building a bridge between both sides of the disease equation—epidemiology and ecology.”

The dialogue fostered by the conference gave rise to a number of promising new education and research agendas. These include hiring ecologists in schools of public health, sharing disease ecology findings with health and veterinarian practitioners, developing interdisciplinary graduate programs to train the next generation of medical and ecological professionals, and holding future cross-discipline conferences. Conference proceedings will be published in a book, *Infectious Disease Ecology*, available in 2006.

Funding for the conference was made possible through support from the National Science Foundation, Dutchess County, Doris Duke Charitable Foundation, the U.S. Department of Agriculture, the National Oceanographic and Atmospheric Administration, and the Institute of Ecosystem Studies.

Dutchess County Executive William R. Steinhaus noted the conference's local relevance, “Dutchess County recognizes the importance of understanding infectious disease ecology, both globally and locally. We are pleased to support the Institute of Ecosystem Studies' efforts in promoting a broader awareness of the role that ecology plays in informing the management and prevention of infectious disease.” ●

More information about the conference is available on the IES website at www.ecostudies.org/cary11/index.html

Nurturing, *continued from page 2*

David, tell me what it's been like working with Ruth and Faith?

Ruth and Faith have been indispensable volunteers because they have an amazing work ethic. From day one, they wanted to contribute to the success of the greenhouse. They were never afraid to work hard or get their hands dirty. When they get to work potting and propagating, they are like a conveyer belt! It would take two regular volunteers to keep up with one of them. We are incredibly lucky to have them.

What has working at the greenhouse meant to you?

Ruth: Without question, it is the most wonderful therapy. Being surrounded by all the greenery transports you to another place. The work engages your mind and the place stimulates your senses. I've always been the type of person who needs to have plants

Recycled IES Computers Help Bridge the Information Gap

IES Information Technology Manager Ms. Beth Hayes recently donated seven hampers of computers to Per Scholas, a not-for-profit organization that reconditions and recycles used computers. The hampers contained approximately 50 computers and assorted printers, keyboards, and servers that were outdated for use by IES staff.

This is the third time that Ms. Hayes has donated computers to the organization, which provides computer access and technological training to disadvantaged families. Originally focused on schools, Per Scholas now concentrates on getting computers into the homes of low income families. Ms. Hayes comments, “I am happy to recycle our discarded equipment to an organization like Per Scholas. For us, it is a win-win situation. Usable IES computers help bridge the digital divide and retired computers are disposed of safely and efficiently.”

Located in the Bronx, Per Scholas' mission is threefold: to provide reconditioned computers at a minimal cost to low income families, to create computer technology career opportunities for individuals with limited professional options, and to dispose of end-of-life computers in an environmentally sensitive way. To date, the organization, which was established in 1995, has distributed over 30,000 reconditioned computers and trained over 600 students as computer technicians.



Per Scholas



Barry Haydasz

An eastern tiger swallowtail (*Papilio glaucus*) in the Gifford Garden.

Saturday Ecology Program: Butterflies & Their Habitat

On August 13th, from 10am-12pm, explore butterflies and butterfly habitat while hiking the Institute grounds with IES Volunteer Trail Monitor Barry Haydasz. Participants should bring close focus binoculars and sun protection. Dress appropriately, with long pants tucked into socks and sturdy closed-toe walking shoes. The program will meet at the Gifford House Visitor and Education Center at 181 Sharon Turnpike in Millbrook, NY. Free and open to the public. Questions? Call 845-677-7600 x309

growing around me, so it's also been a great perk to get to take plant cuttings home! I still keep terrariums and potted plants on my sun porch.

My love of the greenhouse motivated me to join the Institute's Aldo Leopold Society (ALS). I am happy to spend my money in a way that supports a place I love. The beautiful Gerber daisies from the last ALS Greenhouse Luncheon are on my sun porch!

Faith: I've really enjoyed learning about the different plant collections in the greenhouse. Most of all, however, I cherish the friendships I've made over the years. Weekly trips to the greenhouse strengthened my bond with Ruth and introduced me to lots of new people.

Recognition has also been nice. Every year the Institute gives us a certificate or plaque noting

the number of hours we have donated. I've saved them all and when I look back on them, it feels like quite an achievement!

What advice would you give someone interested in working in the greenhouse?

Faith: If you are a hard worker who loves plants, it is a fabulous place to be and David is wonderful to work with. You will learn and accomplish a lot!

Ruth: I couldn't agree more. I can't imagine the last 18 years without the IES greenhouse. I am so glad Faith and I took a chance and wandered in the building back in 1987! ●

Interested in volunteering at IES? For a list of opportunities visit <http://www.ecostudies.org/volunteer.html> or call Volunteer Coordinator Ms. Susan Eberth at 845-677-7600 x316.

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Newsletter

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Calendar

CONTINUING EDUCATION

Summer is a time for new beginnings; if you haven't before, why not try a Continuing Education course? Below is a sampling of class offerings. To receive the complete brochure, please call 845-677-9643, or visit our web site at www.ecostudies.org/cep.html.

Gardening

- July 9 (1 Sat.): **Fern Identification**
- July 17 (1 Sun.): **Survey of Perennials**
- July 21 (1 Thurs.): **Meadow Style Gardens**
- July 23 (1 Sat. & 1 Sun.): **Landscape Painting at Wethersfield and Innisfree**
- July 24 (2 Sun.): **Organic Flower Gardening & Pest Control**
- Aug 4 (1 Thurs.): **The Weekend Gardener**
- Aug 6 (1 Sat.): **The Independent Garden**



IES Summer Ecology Day Camp Limited Openings!

Do your children enjoy exploring the natural world? Would they like the opportunity to perform hands-on experiments and interact with IES scientists? Consider enrolling them in Ecology Day Camp. Campers will get to explore our 2,000 acre property through ecology experiments, hiking, nature art and ecology games. We have openings in weeks July 5th, July 11th, July 18th, and August 5th. To reserve a spot that suits your summer schedule, enroll ahead! For information or to register, please call the Education Office at 845-677-7600 ext. 316 or visit www.ecostudies.org.

JUNIOR CAMP COUNSELORS

We are now accepting applications for Junior Camp Counselors for the 2005 Summer Ecology Day Camp. Students entering grades 8 and above may apply for this week-long volunteer opportunity. For more information please call Susan Eberth at 845-677-7600 ext. 316.

IES SEMINARS

Free scientific seminars are held at 11am on Fridays in the auditorium from September until early May. The fall schedule will be available in August.

SATURDAY ECOLOGY PROGRAMS

Free and open to the public. Children age 6 and up are welcome with an accompanying adult. Programs begin at the Gifford House Visitor and Education Center, located at 181 Sharon Turnpike in Millbrook, NY. Questions? Call 845-677-7600 ext. 317. Information on upcoming programs is also available online at www.ecostudies.org/saturday.html.

August 13, 10am - 12pm Butterflies and Their Habitat

Explore butterflies and butterfly habitat while hiking the Institute grounds with IES Volunteer Trail Monitor Barry Haydasz. Participants should bring close focus binoculars and sun protection. Dress appropriately, with pants tucked into socks and sturdy closed-toe shoes.

September 17, 10am - 12pm IES Land Use History: An Interpretive Walk

Learn about the ecology of land use on an interpretive walk on the Wappinger Creek Trail with IES Forest Ecologist Dr. Charles Canham. Visitors will explore a range of habitats from forests and old fields to wetlands. Dr. Canham will discuss how plant life reflects past land use patterns and natural succession. 1.3 miles. Please wear sturdy closed shoes and pants.

THE ECOLOGY SHOP

Looking for a unique gift? The IES Ecology Shop features an assortment of nature and gardening gifts. Many items are fair-trade, recycled, or otherwise Earth-friendly, so you can feel good about your purchases. Senior citizens receive 10% off on Wednesdays.

GREENHOUSE

The Greenhouse is a year-round tropical plant paradise and a site for controlled environmental research. Managed using integrated pest management, plants thrive in its pesticide-free environment! Open daily until 3:30pm with a free permit (see HOURS).

HOURS

Summer Hours: April 1 - September 30

Public Attractions: Mon.-Sat., 9-6, Sun. 1-6; closed public holidays. The greenhouse closes at 3:30 daily.
The Ecology Shop: Mon.-Fri., 11-5, Sat. 9-5, Sun. 1-5. (Please note: The shop is closed Mon.-Sat. from 1-1:30.)
Required free permits are available at the Gifford House Visitor and Education Center until one hour before closing time.

THE INSTITUTE'S ALDO LEOPOLD SOCIETY

Through their generous support of IES research, Aldo Leopold Society (ALS) members invest in ecological understanding. In addition to receiving benefits and discounts, ALS members are invited to special lectures, excursions and science updates. To learn more, call the Development Office at 845-677-7600 ext. 120.

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Street address: Plant Science Building,
65 Sharon Tpke. (Rte. 44A), Millbrook, NY 12545

... for education, general information and
The Ecology Shop:

Institute of Ecosystem Studies
Education Program
Box R, Millbrook, NY 12545
Tel: 845-677-5359 • Fax: 845-677-6455

The Ecology Shop: 845-677-7600 ext. 309

Street address: Gifford House Visitor and Education
Center, 181 Sharon Tpke. (Rte. 44A), Millbrook, NY
12545

For information on current IES public events and attractions, visit the news corner at: www.ecostudies.org

For garden tips, visit: www.ecostudies.org/gardens.html.