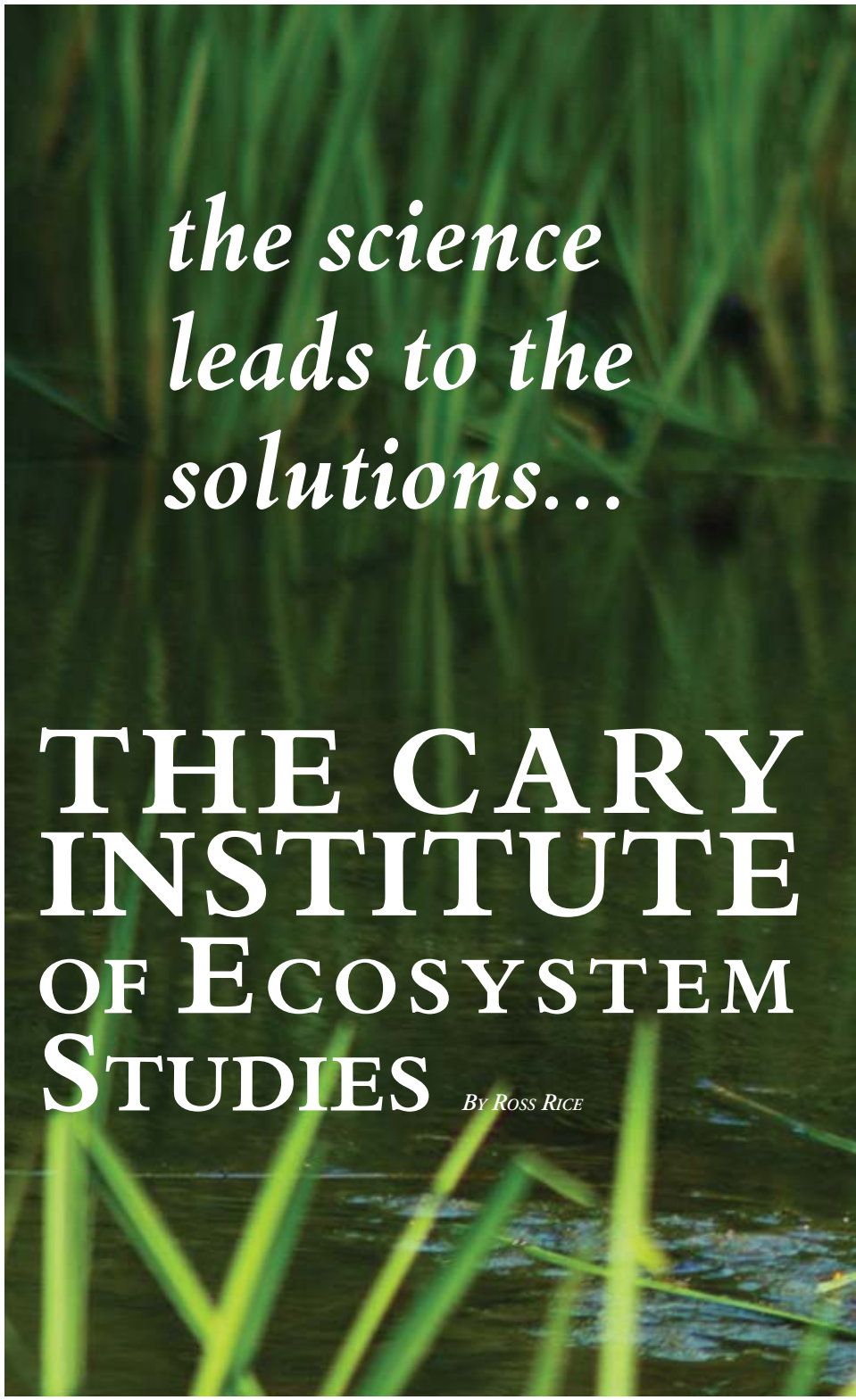

the science leads to the solutions...

THE CARY INSTITUTE OF ECOSYSTEM STUDIES

By Ross Rice

News flash: every living organism on the planet is part of an ecosystem, whether it likes it or not. And as human interference in ecosystems becomes more pronounced, thanks to greater food and energy needs, the objective study of these systems becomes increasingly necessary and, indeed, urgent. It would be prudent for us humans to understand these complex inter-relationships better: nature's way of self-correction can often be brutal; our position on this planet is in no way biologically assured.

Fortunately, we have one of the country's most respected research institutes right here in the Hudson Valley. The Cary Institute of Ecosystem Studies has been providing scientific data on many of the more pressing ecological issues—quantity and quality of freshwater sources, healthy forests, invasive species, pollution, and disease, to name a few—for fellow scientists, researchers, and policy makers since 1983. Free from corporate or political agendas, the Cary Institute has made their research results available to all interested, and have recently been making significant inroads with the regional community with their outreach program, which includes their bi-weekly "EcoFocus" column in the *Poughkeepsie Journal*, a monthly Friday Night Lecture series, and their family-friendly nature trails crisscrossing the 2,000 acres of property.

It's a bit quiet on the Cary campus—off Route 44, just outside of Millbrook—in frigid February, but there are scientists onsite putting in hours, gleaning data from samples collected last year, and staff preparing for upcoming events in the spring. Of course, the institute's articulate president, Dr. William H. Schlesinger, is there, wisely shepherding the Cary into the modern media era, "translating and transmitting" the science in accessible formats, all while managing to keep the research adequately funded. Come the spring thaw, the grounds will come to life with a variety of student programs and research projects, as well as educational and family oriented events. The place has a fun and informal camp-like feel, even in winter, which belies its serious reputation for good, clean ecological science.

Oddly enough, it was oil money that started this. When Standard Oil heiress Mary Flagler Cary and her husband, Melbert Cary, decided to have a country home upstate, they purchased fourteen farms and properties in the hills west of Millbrook, and opted to let the land go natural, building a

Egret, photo by Jordan Jessup

modest cottage for themselves. Following Mr. Cary's passing in 1941, Mrs. Cary—a lifelong nature enthusiast and environmental advocate—spent much of her time tending the property, until her death in 1967. Her Mary Flagler Cary Charitable Trust was established to ensure the maintenance and preservation of the property and to foster "scientific...educational purposes" by a charitable organization "...engaged in the conservation, maintenance, and preservation of natural resources," and in 1971 The New York Botanical Garden was named its custodian, and a successful arboretum was developed on the grounds. But it became clear that the resources of the Trust, plus the 778 hectares of protected land, afforded a unique opportunity to create a center for ecological research and education, thus fully realizing its trust founder's wishes. Of course, a highly respected scientist would be needed around whom to build this center .

Enter Dr. Gene Likens, a chaired professor on the faculty of Cornell University, and a scientist on the forefront of research on acid rain in the 80s. His involvement was later key in making sure sulphur dioxide emissions were addressed in the Clean Air Act Amendments of 1990. In 1983, Likens founded the Institute of Ecosystem Studies on the Cary property, with up to 16 PhD-level scientists on-site, state-of-the-art laboratories, and an ideal location for a wide array of ecosystem research: rivers, forests, lakes, mountains…and massive human activity, all in fairly close proximity.

The Institute finally became an independent not-for-profit in 1993, and has since expanded, with dormitories, residences, a library, and an auditorium added to the grounds. Likens retired in 2007, and in stepped Schlesinger, who had been Likens' student at both Dartmouth and Cornell. He had spent the last thirty years at Duke University, the last six of which he was Dean of the School of the Environment. Schlesinger was ready for the change, "frankly, I had my eye on this job for a number of years. I never thought Gene would retire and give it up. In fact, I'd kind of written it off. But he did decide to step down a few years ago, and one of the trustees contacted me, got in the interview process, one thing led to another, and here we are." The name was changed to the Cary Institute of Ecosystem Studies the following year, in 2008.

Schlesinger, whose expertise was in global change ecology and soil development in the desert Southwest U.S., also brought experience in bringing accurate science to bear on public policy, as his soil studies had impacted the debate on whether or not the East Mojave National Park

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should be expanded. "The Cary Institute was not terribly well known outside the scientific world. When I arrived, I said 'we've got a great reputation with scientists, but we need to come out of our shell. If our work in all of these areas is as good as we say it is, then we ought to translate and transmit what we've done, before we move to the next project.' Basically, people need this kind of information to understand what the problem is, and maybe get a handle on what it will take to do something about it."

There's no shortage of study material in this region, starting with the Hudson River, which has long been a case study in human influence on a large-scale ecosystem. Cary scientists collaborated on securing grants to create the Hudson River Environmental Conditions Observing System (HRECOS), which uses seven monitoring stations to "provide continuous real-time data about conditions such as temperature, salinity, and suspended sediment loads." The stations are mounted on a series of buoys; the raw data can be accessed at the HRECOS website (www.hrecos.org/joomla). The river has been making a comeback thanks to public awareness and activist groups like Sloop Clearwater. Unfortunately, the introduction of the zebra mussels species in 1991—originally native to Russia and introduced via international cargo trade—resulted in the pesky invader taking over and stripping up to 90 percent of the plankton out of the water, severely disrupting the food chain. Study of the invasion confirmed scenarios anticipated by the Cary's Dr. David Strayer, but then almost as suddenly, the zebra mussel population unexpectedly dropped substantially last year, for reasons still unclear. "It could be due to some predator or disease that just took longer to get here than the mussels did," Schlesinger notes. "Nature bounces back with different sets of species becoming more or less important under different conditions. But can you count on that for proper management of the system?" Thanks to globalization, more invasive species will arrive; Cary data from this recent situation may provide answers as to how to better manage them.

Forest health has long been a subject of research at Cary. Although the use of scrubbers in smokestacks has decreased sulphur dioxide emissions substantially, newer emissions have become problematic to forests again in the Northeast. "We're now moving into the same situation with recognizing nitric oxide from power plants forming nitric acid and having not exactly similar effects—because nitrogen is a fertilizer—but strong impacts on systems." The dominant forest growth in the Mid-Atlantic states is pretty much a 40-40 percent mix of beech and maple (the other 20 percent a mix of other species), with beech being a better nitrogen absorber. The beech trees are under attack by another invasive species, a tiny insect that bores into the bark, allowing fungal infestation to spread, killing and deforming trees. Beeches die, maples replace them, but the maples process less nitrogen, leading to increased runoff and nitrogen pollution. Cary scientist Dr. Gary Lovett has been working on a model that predicts how shifts in tree species composition alter the way forests help buffer atmospheric pollution, and store carbon.

Other studies have shown how humans are influencing natural conditions that lead to the spread of West Nile and Lyme's Diseases. In the case of the latter, commercial and residential development and the partitioning of land has a profound effect on the population of the white-footed mouse, which increases when its natural predators are driven out by human habitation. "That's where the virus gets amplified, and the tick population builds up, so when you go into the forest and get bit, you're likely to get exposed to it," Schlesinger points out. "There are ways we can make them less effective reservoirs of disease without eliminating the mice. Ways immunologically that could make them a less effective host."

The leitmotif that keeps running through each example here is the human factor, be it the effects of pollution and land exploitation, or the influence of man-made climate change. As someone who has studied the plethora of data for decades, Schlesinger doesn't mince words. "Global warming right now is the subject of one of the most heated debates including whether it's occurring or not. I think the evidence that it's occurring is unequivocal, and the evidence for impacts is pretty scary. We're trying to get people to understand that." That's not to say that the Cary has a political agenda. "We try to get our science out there, to be seen and understood. To make sure that something that might be very esoteric to a faculty member is clear to the recipient. But we come short of saying something like 'therefore, you should support House bill 298 or whatever.' Let the politicians thrash that one out."

DR. SCHLESINGER SPEAKS TO AUDIENCE DURING A LECTURE AT THE CARY INSTITUTE PHOTO BY JOHN HALPERN; R: CARY INSTITUTE CAMPERS PHOTO BY LISA CISSEL

Zebra mussels on an anchor, photo by Pam Freeman

The human influence on ecosystems has become more ingrained into the studies. Schlesinger admits, "well, very much (more) compared to when I was a graduate student 30 years ago. We now study ecosystems with humans as part of them. Used to be when we did a PhD. in ecology you went to the most pristine place you could find and try to study nature the way it used to be. That's really fallen out of fashion, and I think rightly so. There's no part of the world that hasn't had a human impact, so we're responding to that. One of our big projects here—with Dr. Steward Pickett—is the Baltimore Ecosystem Study; the study of a city….as an ecosystem."

"Sure it's got lawns and trees, but it's also got pavement, sewers, a watershed they're monitoring on a regular basis. Cities can be designed—and redesigned—to have less impact on the coastal environment. This ecosystem study puts the human in the center. It recognizes that the vast percentage of our population globally lives in urban areas, and that we really ought to be understanding the way they function."

The Cary Institute is not your typical research lab complex (like I'd even know what that is); it has a loosely academic feel. Schlesinger laughs, "I tell everybody (here) they look very similar to faculty members at colleges and universities, but they opted to come here, to pursue full-time research on environmental issues. The responsibilities that they give up by not having to teach, they gain by having to write numerous grant proposals!" Spring suddenly brings an extended student population, as the Institute has several youth programs, including the Millbrook and Poughkeepsie school systems. Earth Day is also popular here; most regional communities want a Cary person to judge a science fair, or lead a nature walk. Speaking of which, the trail system on the grounds is being improved again this spring, with several kiosks stocked with information about what you are actually seeing, in terms of an ecosystem.

And though the Cary Institute is not on the Marcellus Shale formation, I can't help myself; I have to ask Dr. Schlesinger about where the Cary Institute stands on the controversial natural gas harvesting technique known as hydrofracking. "It is on our radar screen, we have a couple of people who are very interested in the problem and are working on it. We've had trouble finding anybody who has been interested in funding it that is not connected to the industry. And we've been very reluctant to take corporate money to study the Marcellus Shale. So the answer to that is yes and no; I hope we can get a program going. It is the signature environmental issue in the state, and it needs some good work done on it. I would like to think that we could do it." Time is moving fast on this subject though; funding help from the EPA or private foundations has been sorely lacking. "Our development people are scouring for (help). But it needs to happen right now, the industry is lurking out there, getting ready to drill." And the moratorium stops in June of this year.

Schlesinger is a genial host, more than happy to make the complex data they've collected make sense, objectively and impartially. And the Cary Institute will certainly be called upon many times to assess and present the realities of the ecosystems we live in and share with other life forms. It is an uphill battle against those who would prefer to disregard their science in favor of corporate profit. But Schlesinger seems optimistic, genuinely inspired by the enthusiasm of the student assistants, and the quality of the science he and his colleagues provide. "You take a job like this, you've got to wake up every morning and look in the mirror, and just go: the world is going to hell. So there are ten issues facing you, you may lose on nine of them. But you shave, and put on your tie, and go to work to get the one. I wish the world were different. I'm not sure it's in human nature for it to be different. But you can't give up, got to go after the one issue, hope it makes a difference."

The Cary Institute is located at 2801 Sharon Turnpike (Rte. 44), Millbrook, www.caryinstitute.org, 845.677.5343. Hiking trails open April 1. The next Friday Night Lecture on March 11, is with Donovan Hohn, author of Moby-Duck: The True Story of 28,000 Bath Toys Lost at Sea, 7 *PM*