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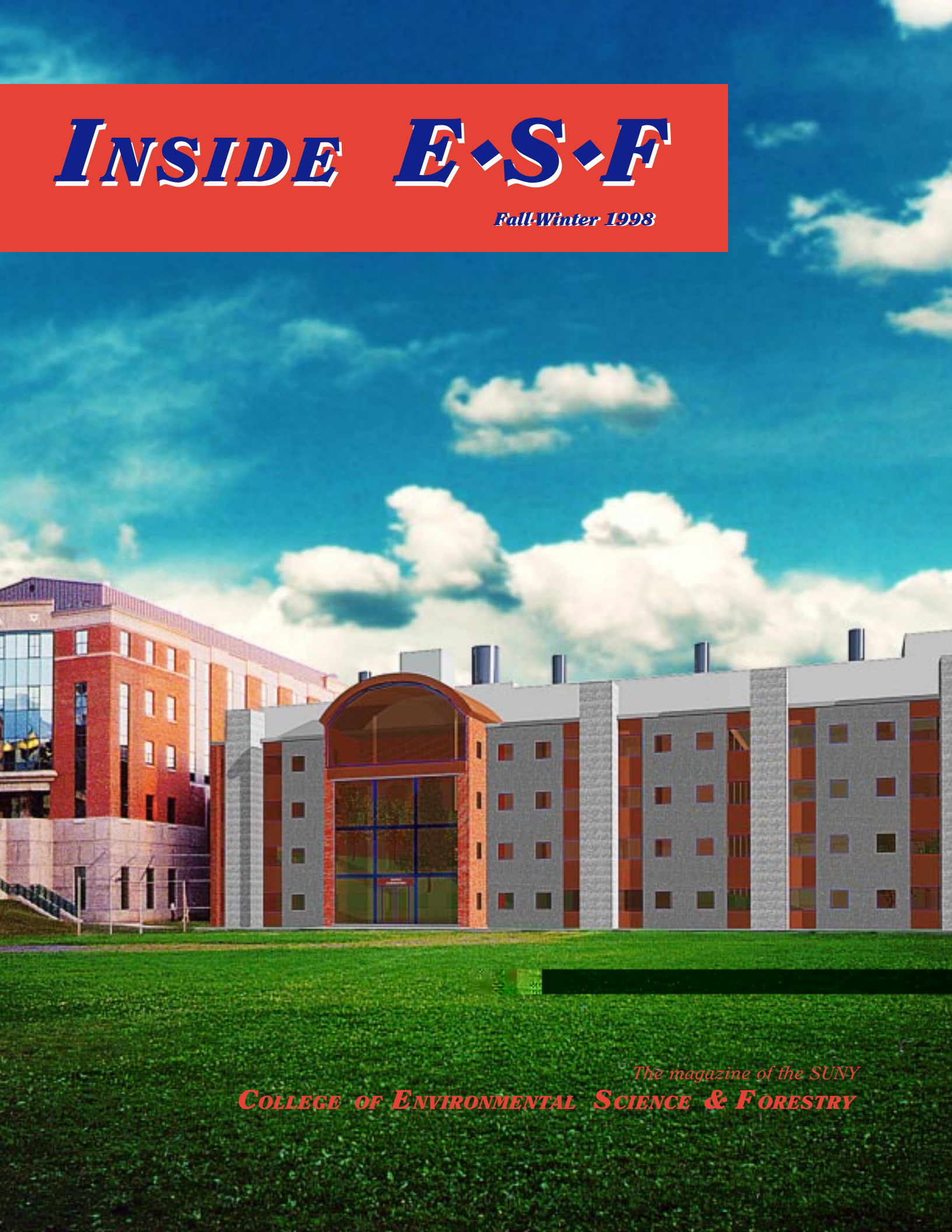
Fall-Winter 1998



The magazine of the SUNY

COLLEGE OF ENVIRONMENTAL SCIENCE & FORESTRY

Inside ESF is published four times each year for alumni and friends of the SUNY College of Environmental Science and Forestry.

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In This Issue

The State University of New York College of Environmental Science and Forestry offers a diverse range of accredited programs and degree options in chemistry, construction management and wood products engineering, environmental and forest biology, environmental resources and forest engineering, environmental studies, forest resources management, forest technology, landscape architecture, and paper science and engineering.

The College's mission is to be a world leader in instruction, research, and public service related to: understanding the structure and function of the world's ecosystems; developing, managing, and using renewable natural resources; improving outdoor environments ranging from wilderness, to managed forests, to urban landscapes; and maintaining and enhancing biological diversity, environmental quality, and resource options. As such, ESF has maintained its unique status within SUNY's 64-school system as one of only four specialized colleges and one of only eight doctoral-granting institutions.

ESF takes affirmative action to provide equal opportunity for all people and to build a campus community that reflects a wealth of diversity.

Campus Views

Preparation For College Teaching At ESF

by Jack Tessier

ESF is an institution known for excellence in scientific inquiry. Along with improving myself in this area, I am attending ESF in preparation to be a college professor. Although ESF may not be as well known for programs in education, multiple opportunities exist to develop skills and gain insights in the art and science of university teaching and learning.

My family has more than its share of teachers and my personal interest in teaching was developed through scouting activities and tutoring opportunities in high school and college. Combining the desire to teach with a deep appreciation for the natural world leads directly to ESF, and my goal of being a college professor.

My first orientation experience upon arriving at ESF was the Colloquium on Teaching and Learning. This is a training and information session for beginning graduate assistants (GAs). Participants are given ample opportunity to ask questions of various people from the ESF community. Most importantly, I met experienced GAs who helped me with the many details of beginning both an academic program and a GA experience. I also met other incoming GAs, with whom I still hold deep friendships that have helped me greatly in multiple facets of my ESF experience. The colloquium continues to be a lasting memory and reminder of ESF's commitment to teaching and learning.

This fall I had the opportunity to serve as a teaching fellow for the colloquium, to "give back" what I learned to the campus community and assist incoming GAs the way I was helped. If teaching others about what we know is important to our way of life, then improving the way we prepare teachers is even more critical. Thus, the colloquium completes the circle and creates a positive feedback loop.

An academic influence on my preparations has been the Seminar on College Teaching (FOR/EFB 797). The seminar helped me analyze components and synthesize ideas about approaches to collegiate teaching and learning. Particularly of value was the journal I kept throughout the course. It helped me reflect on my teaching experiences and consider what was working and what needed improvement.

Another valuable outlet is ESF Faculty Governance's subcommittee on instructional quality. The subcommittee supports educational symposia (Teaching Tools and the Symposium on Teaching, Learning, and Technology) and, in general, considers approaches to heighten awareness and thought surrounding instruction. Although my involvement has just begun, I believe the subcommittee will provide an important avenue to learn more about efforts within the educational community to improve instruction.

Jack Tessier

Perhaps the most important component of my teacher preparation has been my two years as a GA in the Faculty of Environmental and Forest Biology. The experience helps me learn to deal with the day-to-day problems such as covering different topics and working with different professors with different approaches to education. My GA experience has shown me the satisfaction of learning, teaching, and giving of oneself within the overall system of the educational process. Everyone who aspires to teach at the college level should have the opportunity to serve as a GA.

Lastly, observing and taking note of the approaches and methods of colleagues, mentors, and other exemplary professors at ESF have nourished and encouraged me. Of course, there is no single best way to teach or to learn. Observing the daily happenings at ESF has helped me experience some of the options and encouraged me to seek out the best option for each student as much as possible. Reactions to teaching methods might change with time. Years could pass before the value of certain approaches is realized, which adds to the complexity of choosing the appropriate teaching method.

ESF has broadened my view of the "Ivory Tower" and helped me get an up-close look at my future in education. The ESF community has taught me to consider different teaching styles—to not be closed off to any one way or too supportive of any other. The improvement of teaching and learning is the responsibility of every teacher and aspiring teacher.

Jack Tessier is a doctoral candidate and research assistant in plant ecology in the Faculty of Environmental and Forest Biology.

Campus Update

VanDruff Has 'Wild Adventure' In NYC

ESF Professor Larry W. VanDruff will appear in a Turner Broadcasting System production next May hosted by award-winning actress Isabella Rossellini.

Craig Tufts, Isabella Rossellini, and Larry VanDruff take a break from filming in Central Park.

A recognized expert in urban wildlife, VanDruff spent three hours filming a segment on gray squirrels in Central Park with the international star. The material will be featured in the program *Wild!Life Adventures*. The episode, *Wild City*, will focus on a host of issues dealing with wildlife in New York City.

Craig Tufts of the National Wildlife Federation, who is *Wild City* co-host with Rossellini, recommended VanDruff to appear on the program.

VanDruff has used the gray squirrel to teach population ecology and biology in his classes here since joining the ESF faculty in 1970. He conducted a series of studies of gray squirrel populations with student help over several years in Oakwood Cemetery.

A 1980 sabbatic leave took him to Washington, D.C. to study gray squirrels in Lafayette Park across from the White House. The work was done under the auspices of the National Park Service.

One segment of the shoot shows Rossellini and VanDruff using peanuts to attract squirrels to the site. "It's a great people activity," he said. "It promotes our interaction with the squirrels which makes us appreciate wildlife and our role in the environment.

"For the squirrels it's not such a good activity," he said. Human feeding of wildlife reduces their need to forage and the animals lose their natural wariness. Human foods generally constitute a poor diet for animals and concentrate their numbers, which can contribute to a higher incidence of disease.

VanDruff said he was nervous about meeting the film star, but that Rossellini "was very gracious, a wonderful person. It was a delightful experience."

Gov. George Pataki, third from left, with ESF trustees, left to right Daniel Fitts, President Ross Whaley, Thomas Burkly, Robert Moses and Heidi Busa.

Governor Comes Back To ESF To Talk About Capital Plan

New York Governor George Pataki was back on the ESF campus August 26 to promote his $2 billion five-year capital plan for SUNY.

Among the projects included in the plan is the renovation of the college's Hugh P. Baker Laboratory, featured on the cover. Pataki detailed local capital projects, campus improvements, and technology upgrades at ESF and the SUNY Health Science Center at Syracuse.

In addition to the Baker renovation, ESF is in line to receive some $1.4 million in funding to increase

continued on next page

the college's distance learning capabilities, and approximately $4 million to rehabilitate classroom, laboratory, and living spaces at the Ranger School in Wanakena, N.Y. Funding currently allocated to the Baker rehab totals $14.8 million.

"ESF is recognized throughout the world for the high quality of its academic programs," said President Ross S. Whaley. "To continue to build upon our tradition of success, these programs must be supported by advanced technology facilities such as those that will be provided by the planned rehabilitation of Baker Laboratory."

Jahn Lab Appeal Tops $1.1 Million

A gala dinner Thursday, October 22, capped ESF's successful Appeal for the Jahn Laboratory.

The Jahn Lab Appeal raised more than $1.1 million to purchase new scientific equipment and to establish student scholarships for ESF's Faculty of Chemistry. The Edwin C. Jahn Laboratory, the first new building on campus in more than 30 years, was dedicated in October 1997.

"This was a groundbreaking campaign for ESF," said College President Ross S. Whaley. "It was the first time in our history we were called on to mount a substantive campaign and, in a very short time frame, raise more than $1 million. I'm very proud to say that—with the generous help of our friends and alumni—we were successful at it."

More than 120 people attended the reception and dinner including those individuals who contributed $1,000 or more.

Alumnus Walter P. Smith, Class of '54, made the largest contribution to the fund. Smith, of Portola Valley, Calif., was on hand to see the Jahn Laboratory's main teaching

continued on next page

Whaley To Leave College Presidency

ESF President Ross S. Whaley announced he will leave his position as president effective July 1, 1999. Whaley made the announcement at the October 23 meeting of ESF's board of trustees.

"We are fiscally, programmatically, and physically strong. We have a well-qualified management team in place…and we have developed a good working relationship with the SUNY administration and board of trustees," said Whaley. "It is a time when a new president could devote his or her attention to an exciting future for ESF without the encumbrance of a long list of problems."

Whaley plans to remain at ESF and return to teaching. He is a nationally recognized expert on natural resource management and development.

"During his more than 14 years of leadership at ESF, President Whaley has established an admirable reputation for himself and that institution," said SUNY Chancellor John W. Ryan.

"The State University is indebted to him for his loyalty, dedication, and excellence of service. He has brought prestige to the college and the university during his tenure."

Ryan said he would recommend to the SUNY board of trustees that Whaley be named a "university professor." That title, said Ryan, "recognizes his enormous contributions and allows him to continue his exemplary service to the college and the university."

Ross S. Whaley

Curtis H. Bauer '50, chairman of ESF's board of trustees, was named to lead the search committee for a new president.

Whaley was appointed president of ESF April 1, 1984, leaving a position as director of forest economics research with the U.S. Forest Service in Washington, D.C. He also held teaching and administrative positions at the University of Massachusetts, Colorado State University, and Utah State University.

During his tenure as president, Whaley oversaw both ESF's physical and programmatic expansion. Sponsored research program annual expenditures doubled to $6.2 million in FY '97-98. Student applications to the college have risen steadily during the last 14 years.

In addition to his duties as president, Whaley has pursued an impressive array of public and professional service activities.

laboratory, for organic chemistry, dedicated as the Walter P. Smith Laboratory. Smith's donation of $200,000 also is the largest single gift the college ever received from an alumnus.

The environmental chemistry teaching laboratory has been named the Niagara Mohawk Laboratory through a gift from the Niagara Mohawk Foundation.

The polymer and analytical chemistry laboratory was named the William D. Gooden Laboratory through a gift made by Edward K. Mullen '47 on behalf of The Newark Group of Cranford, N.J. Mullen is chairman and CEO of The Newark Group, one of the country's largest producers of recycled paper and boxboard products. The gift was made in memory of Gooden, a 1970 ESF graduate who was Newark's national regional manager at the time of his death.

The celebration dinner was co-sponsored by ESF and the ESF College Foundation Inc. R. Leland Davis, Foundation president, served as master of ceremonies.

Pataki Appoints APA Chief To ESF Trustees

The executive director of the Adirondack Park Agency was appointed to the ESF board of trustees by Governor George Pataki.

Daniel T. Fitts of Lake Placid has worked with the Adirondack Park Agency since 1987. He was supervisor of administrative services before taking over as executive director in January 1995. Before joining the agency, he was employed with state Sen. Ronald B. Stafford, R-Warren, for seven years, first as a legislative aide and then as Stafford's legislative director.

Fitts is a native of Rouses Point in Clinton County. He earned his bachelor's degree in environmental science from SUNY Plattsburgh in 1976. He earned a master's degree that was issued jointly by ESF and Syracuse University in 1980. The focus of his graduate study was law and policy administration, resource management, and land use planning.

Barrier-Free Trail Opens At Pack Forest

After seven years of hard work, the barrier-free Grandmother's Tree Nature Trail at ESF's Pack Forest in Warrensburg is complete.

A log-cutting ceremony opened the trail June 13. The ceremony was co-sponsored by the Greater Adirondack Resource Conservation and Development (RC&D) Council and ESF.

"Creation of the barrier-free nature trail is a real plus for the Warrensburg-Lake George communities," said Richard A. Schwab, ESF's director of forest properties. "It is the only handicapped-accessible trail in the southeast Adirondacks that is located in an old-growth forest environment."

According to RC&D President John A. Rieger, "The completion of this trail represents the culmination of years of perseverance by many dedicated people. The public and private sectors pulled together to make it happen."

Most ESF professors have authored or contributed to books. But none of those books were designed to help young children learn to count. Ghost Bat in a Gum Tree *by Bennette Tiffault, a lecturer in ESF's writing across the disciplines program, uses illustrations and text about endangered species to create a delightful 'early reader' with a message about our disappearing wildlife. Illustrated by Peter Grosshauser,* Ghost Bat *is published by Falcon Publishing, Inc. of Helena, Mt.*

Labor Day Storm Damages Greenhouses, Other Campus Facilities

by Jeri Lynn Smith

The U.S. Weather Service called it a derecho (de-RAY-cho)—a squall line of thunderstorms packing straight-line winds with a punch.

The storm, with gusts up to 115 miles per hour, killed two people at the New York State Fairgrounds and left more than 140,000 individuals without power—some for more than a week. The winds devastated thousands of trees, homes, and businesses as they blew through Central New York during the early morning hours of September 7.

Windows in the eight greenhouses on top of Illick Hall were shattered, embedding shards of glass in many of the plants and sending glass raining down onto the Quad and walkways across campus. "One (greenhouse) frame is substantially bent and will have to be reconstructed," said ESF President Ross S. Whaley.

All academic buildings sustained varying degrees of roof damage. Several lost some windows and suffered water damage to walls, floors, or equipment. ESF lost almost two dozen trees on the Syracuse campus and 60 more at the Experiment Station on Lafayette Road.

"It was a disaster area," said Howard Bruse, supervisor of grounds. "I walked around campus and I couldn't believe it."

ESF will receive $200,000 in emergency repair monies from the State University Construction Fund, said Brian Boothroyd, facilities program coordinator, to cover repairs associated with the storm.

The most severely damaged greenhouse suffered structural damage.

The college was among a handful of locations in Syracuse that did not lose power and repairs began almost immediately. Physical Plant supervisors and work crews arrived as early as 2 a.m. along with college administrators, and contractors were working by mid-day.

The workers had help. About 25 ESF students arrived on campus throughout the afternoon, individually and in groups, to volunteer their services in the clean-up effort.

Senior Sarah Gilbert, armed with protective gloves and a trash can provided by Physical Plant, spent most of the day picking up glass from the Quad. "After all," she said, "it's *our* campus, too. We have a lot of pride in it."

ESF faculty and staff also were at work in the larger community helping repair the damage done by the storm. The college's extension office fielded hundreds of questions from individual homeowners in the weeks following Labor Day.

A number of faculty members are participating with area officials in a community-wide dialog on new landscaping for Syracuse, and several have joined forces with individual groups and organizations, such as the DEC, to educate people on how to choose the right tree for the right site when replanting.

"You hear about disasters all over the world," said Extension Specialist Kim Adams. "This one took place right in our own backyard. We have to be out there and be visible. We have to help."

Smith is director of News and Publications at ESF.

For a different view of the storm and its effects, turn to page 13.

AN ENVIRONMENT FOR CHANGE IN A CHANGING ENVIRONMENT

BY CLAIRE B. DUNN

At its most benign, the biochemical phenomenon known as red tide can blight a vacation at the beach. At its worst, it can kill people and wreak havoc on shellfisheries.

Why do tiny organisms in the sea produce a poison potent enough to kill human beings? The question has intrigued Dr. Gregory L. Boyer for 25 years.

"It didn't seem to make sense that little algae floating out in the middle of the ocean would make a toxin that would kill humans," he said. "It's not an easy molecule to make. The organisms have invested a lot of energy in making these things. So there's got to be a reason for it."

In the pristine confines of ESF's new high-tech Edwin C. Jahn Laboratory, Boyer is searching for the driving force behind certain harmful algal blooms known as red tide.

His work could not have been done in Hugh P. Baker Laboratory, chemistry's former home. The building was simply too old and—from a scientist's point of view—too contaminated for such exacting work. There was enough trace metal in the air to raise questions about the results of experiments that involved precise amounts of the same substances.

"So Jahn Lab has been a real boon in that regard," Boyer said. "We now have a clean environment where we can work on this stuff."

Boyer was one of the first faculty members to move into the new building, which opened in October 1997. Graduate students have been at work in Jahn for a year and undergraduates are taking classes there this fall.

The building provides ESF's faculty members and visiting researchers with clean, efficient, modern facilities.

"Things are certainly easier to do here," said Dr. John P. Hassett, chair of the Faculty of Chemistry. "There is much better ventilation, much better power. The air is cleaner, there's not as much dirt around. The atmosphere is controlled and steady. And not only are the people more comfortable, the instruments like it, too."

Heat and high humidity can interfere with the operation of advanced analytical instruments, such as gas chromatographs. Summers in Baker were "difficult," Hassett said.

Boyer is one of several ESF chemists whose work is closely tied to observing changes in the environment and analyzing their effects. Dr. David J. Kieber is studying the way changes in the spectrum and intensity of sunlight affect photochemical processes. In particular, he focuses on the way changes in the amount of ozone in the atmosphere affect water chemistry. Dr. Theodore S. Dibble's work centers on air pollution, using lasers and supercomputers to investigate the breakdown of organic compounds.

The work is timely. Ten months into 1998, the year's average temperature ranked as the third warmest on

record in Syracuse. It was a fraction of a degree behind 1949 and within striking distance of 1933, the hottest year on record.

Kieber's work took him to Antarctica this fall to sample ocean water. He works with a photobiologist from the Smithsonian Institution and a microbiologist from the University of West Florida. In addition, ESF graduate student Gary Miller of Syracuse, and undergrads Todd Medovich of Candor, N.Y., and Steven Beaupre of Fulton, N.Y., are doing research on the ship, along with an undergraduate from Carlton College in Minnesota.

The crew was at sea for five weeks, living and working on the *RV Laurence M. Gould*, a vessel run by the National Science Foundation. They are working north of the Antarctic Circle, near the point where the Woodell and Scotia seas meet.

"Basically what we do is take the lab from here and put it on a ship and take it down there," Kieber said. "We're one of the first groups of chemists that has worked there. For the first time, we're relating photochemistry to biology."

"We're studying the interactions between chemistry and biology," he said. "We're looking at production rates, how fast things change, how the change in sunlight affects it all, both at the surface and deeper. How fast do the changes occur at different wavelengths? If we can figure it out, we can start modeling it."

A need for effective modeling is also a force behind Dibble's work. His field is physical chemistry, in particular studying the breakdown of organic compounds in the atmosphere. He uses high-tech equipment to investigate the chemistry of smog.

"This kind of science is really lasers and lights," Dibble said.

Dibble's lab in the Jahn building is draped with the same type of black, flame-retardant curtains used in theaters to keep out excess light. Wearing protective goggles, he and his team of three graduate students shoot lasers at stable chemical compounds, breaking them into unstable compounds that are normally found in concentrations nearly too low to measure. Under the controlled laboratory conditions, the concentrations are high enough to measure with a second probe from the pulsating laser.

"These are reactive chemicals," he said. "You can't buy them in a bottle from a chemical supply shop."

The light flashes at a blinding 10 megawatts, but for just a fraction of a second. It could flash 20 billion times in a second.

"It sounds like a lot but it averages a total of 10 watts, less than a standard light bulb," Dibble said.

The tests help reveal how quickly certain compounds are removed from the atmosphere, and what kind of chemistry moves the process along.

"This kind of science is really lasers and lights," said Theodore S. Dibble.

Dibble's research, supported by the National Science Foundation, is to provide better data for computer models used by regulatory agencies in air pollution control efforts. The federal Environmental Protection Agency gives individual states the responsibility for reducing ozone levels; in New York, the job falls to the Department of Environmental Conservation.

"You can divide ozone into three basic types," Dibble said. "The good, the bad, and the ugly. Its location in the atmosphere changes the role it plays. At ground level, it does more harm than good."

Good ozone, about 15 miles above Earth, provides protection from the sun's ultraviolet rays. This is the ozone that is supposed to be protected by the elimination of Freon, the same ozone layer where holes are found in the Arctic and Antarctic.

The bad ozone is lower, about five to 10 miles above the Earth's surface, where many scientists believe greenhouse gases help raise the temperature of the lower

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atmosphere. That layer led to the Kyoto Accord to lower limits for automobile emissions.

Ozone gets ugly at the ground level, where it takes the form of smog and can cause breathing problems.

Three factors contribute to ugly ozone: sunlight, the uncontrollable factor; organic compounds in the gas phase; and nitric oxide/nitrogen dioxide, the byproducts of combustion.

Boyer studies the way different nutrients affect toxin production. One aspect of his work looks at the biochemistry and physiology involved in harmful algal blooms; in short, what causes them? The flip side looks at the chemistry of detecting toxins. Toward that end, his focus is improving and simplifying the instruments used to study and detect the algal blooms known as red tides, some of which are toxic to shellfish.

While researchers know that nutrient factors affect toxin production and cause the malady known as paralytic shellfish poisoning, they just don't know exactly how it all works. The major funding sources for Boyer's work are the New York Sea Grant Institute and the U.S. Department of Agriculture.

Gregory L. Boyer grows algae to look for simpler ways of testing ocean

There is evidence red tides have existed for hundreds of years. In the 1970s, they were found in the Bay of Fundy; in 1972, they were off the coast of Maine; in 1976, they were found near Massachusetts.

"We have been able to watch these things march down the coast," Boyer said. "They don't occur every year, which raises the question, 'What causes them to occur?'

"It's not just people who die from eating poisoned shellfish. Birds die. There was a case of whales dying. The zooplankton ate the algae, the salmon ate the zooplankton and the whales ate the salmon and died. So it isn't just that people are the only ones who die, it's just that we hear more about it."

Gone are the days of injecting mice with toxins and waiting for them to die. Boyer's tools are the instruments of the '90s: high-performance liquid chromatography (HPLC) and graphite electrodes.

"We use a lot of novel techniques that were developed here," Boyer said.

Ten years ago, he was part of the team that designed a process for using HPLC to test for red tides. He is working on methods that will allow an HPLC test to show researchers only the toxic compounds they are seeking when separating and analyzing the contents of shellfish.

The process has worked well, he said, but is still too complex for use by anyone but a highly trained chemist.

"Now we're trying to dumb-engineer the HPLC down, with half the moving parts, half the hardware, so it's cheaper and easier for anybody to use," Boyer said. "Our goal is to make a system where all you have to do is turn on a switch and the equipment does everything."

He displayed a prototype of the new unit during the summer of 1997 at the Sixth Canadian Workshop on Harmful Marine Algae. There is one unit functioning at the St. Andrew's Biological Station in New Brunswick, Canada, and another in the Jahn Lab that Boyer hopes to see tested in Antarctica.

Boyer wants to simplify a paralytic shellfish poisoning analyzer enough that it can be taken outside the laboratory and used on fishing boats.

"We're going to really have to engineer it down so you can put it on a boat and bang it around," he said. "We want fishermen to be able to use it."

A mobile analyzer would allow a fisherman to open a few scallops, puree them into a blender, and inject some of the extract into the unit. It would detect toxins in the shellfish, revealing whether they were safe to eat or deadly poisonous.

"What we're trying to do is develop a 'quickie' test. We'd like a green-yellow-red dial that would tell the fishermen, 'Stop right there. Turn around and go home.'"

Dunn is assistant director of News and Publications at ESF.

Saving The American Chestnut

Genetic Engineering Could Turn Out Blight-Resistant Species

by Claire B. Dunn

Laboratories in quiet corners of ESF could reveal the secret to revitalizing what was once a major component of the nation's eastern forests: the American chestnut tree.

Two ESF professors, a research associate, and a small group of graduate students are in the painstaking process of genetically engineering an American chestnut that is resistant to the invasive blight that nearly wiped out the species 50 years ago.

This fall, the work is being undertaken with renewed energy. The current New York state budget provides $150,000 to fund the American Chestnut Program at the college. It is anticipated that this appropriation is the first installment of a three-year research effort totalling $450,000.

Senator Mary Lou Rath (R-Erie and Genesee counties) was the lead legislator in obtaining funds for the research program and was successful in securing bipartisan support in both houses of the state Legislature.

"We were teetering on the brink of bankruptcy. We were literally down to the point where we had a couple hundred dollars left. So the state grant saved the project," said Dr. Charles A. Maynard, a specialist in forest genetics and tissue culture who is a professor in ESF's Faculty of Forestry.

One aspect of the research is the province of Dr. William A. Powell, a molecular biologist in ESF's Faculty of Environmental and Forest Biology. He is searching for genes that will make American chestnuts resistant to the fungus that kills them.

One possibility, he said, is transferring a natural defense gene from another plant into chestnut trees. He is working with a gene that helps wheat seedlings protect themselves from fungi found in the soil. The gene neutralizes the acid produced by the fungi and as a byproduct produces hydrogen peroxide, which stimulates the seedling's natural defense mechanisms.

Or, the answer might be in frog skin.

Researchers have discovered that frogs have a gene for an anti-microbial peptide that prevents the damp skin of frogs from being covered with fungi and bacteria. Anti-microbial peptides are a class of short proteins found in a wide range of organisms, including frogs, moths, and human beings. Powell redesigned the frog gene in the laboratory to make it effective against the blight pathogen.

The third focus of Powell's attention is a gene that enables certain fungi to digest other types of fungi.

This fall, assisted by graduate students, Powell focuses on assessing which of the three genes is the best choice for the chestnut project. He also works on attaching the DNA sequence that acts as a promoter, allowing the gene to be effective in the

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Zizhuo Xing, William A. Powell, and Charles A. Maynard show off a seedling developed in their labs.

trunk and branches of the tree, the only parts of the chestnut affected by the blight.

While Powell is working on genes, Maynard and Dr. Zizhuo Xing, a plant tissue culture specialist, are across the ESF quad in Marshall Hall, perfecting techniques for transferring genes into chestnut embryos.

The members of Maynard's research team remove the developing embryos from a chestnut. Normally, one of those embryos would mature into a seedling. But, using a process called somatic embryogenesis, the scientists can back up the chestnut's cycle a few steps so it continues to produce more embryos. The process was developed in Georgia and modified by Xing, who works in ESF's Faculty of Forestry.

After the embryos multiply, the researchers perform the gene transfer, bombarding the embryos with the blight-resistance genes with which Powell has been working. Then they determine which embryos carry the gene. When the developing embryos are large and strong enough, they are transferred into a potting mix and nurtured in a growth chamber where light, heat, humidity, and temperature are controlled. Powell tests the young plants to determine if they indeed have the blight-resistance gene, and those that do are moved outdoors to the college's LaFayette Road Experiment Station so their growth can be monitored.

It is a tedious, time-consuming process.

"We've got to get better at it before we can talk legitimately about cranking out thousands of trees that people can plant in their yards," Maynard said.

The American chestnut is a member of the oak family. It tends to grow straight, making it suitable for use as telephone poles and railroad ties. Pioneers used chestnut logs for the foundation of their cabins and homeowners would likely use it for backyard decks if it were available today.

"The heartwood of the species is amazingly rot-resistant," Maynard said. "It is the natural equivalent of pressure-treated lumber."

In addition to the practical aspects of having American chestnuts towering in the forest, Maynard said, there is some old-fashioned nostalgia attached to the stately trees.

"Everybody's grandpa passes down stories about gathering chestnuts and throwing them back and forth at each other across the creek, and turning out the hogs into the woods to fatten up for the winter," Maynard said. "It's part of the whole cultural, nostalgic thing."

The blight was first identified at the Bronx Zoo in 1904. By 1950, few American chestnut trees survived.

"In New York, we have the distinction of being the first place where the blight started," Powell said. "It would be really nice to be the place where it ends."

Campus Profile

The Derecho: What A Blast!

by Gordon Heisler

Over the summer, the U.S. Forest Service and Faculty of Forestry collaborated in a study of water use by urban trees. Our instruments are located beside an 8-foot tall red maple tree near the northwest corner of Marshall Hall. The study was possible because of the helpful cooperation of Howard Bruse, Physical Plant's supervisor of grounds, and his staff.

A number of people have asked what the instruments, which include meteorological sensors, have to say about the Labor Day storm. Though data collection procedures for the study were not designed to measure wind damage, there is some information of interest from sensors that operated throughout the storm.

Physical Plant Supervisor Peter DeMola, in the bucket truck, removes limbs from damaged trees next to Marshall Hall.

The sensors are about 30 feet west of the northwest corner of Marshall Hall, and about 60 feet south of Moon Library. They measure wind speed and direction at 7 feet and air temperature and humidity at 5 feet above ground. The wind sensors are just a foot below the top of the sample red maple tree and about 5 feet horizontally to the south. They are about 10 feet below the level of Moon Library's roof to the north. Trees and shrubs block the northeastern quarter, Marshall Hall blocks east through southeast, and Jahn Lab is to the southwest through west. The site is relatively open to the west through northwest.

Our equipment recorded averages from the wind, air temperature, and humidity instruments over five-minute periods along with total rainfall summed over five minutes. We also recorded the highest 10-second average wind speed during each day, the measurement that turns out to be of most interest.

On the night of the storm up to 1:14 a.m. our instruments showed unusually light winds—less than one mph—blowing from variable directions between the northeast through south. Air temperature was steady at 74°F and relative humidity was about 76 percent, all rather pleasant conditions.

Between 1:14 and 1:19 a.m., wind speed picked up dramatically to an average of 8 mph, direction shifted to southwest, and rain fell at a rate of 1.3 inches per hour. The 8-mph speed is not especially remarkable; however, the highest five-minute average speed we recorded here in this somewhat protected location during the last three weeks was about seven mph. The average wind speed probably was much increased by high winds in the last part of this five-minute period, judging from the next averaging period and National Weather Service radar images.

Between 1:19 and 1:24 a.m., wind speed averaged 23.4 mph and average direction moved around from southwest to 36 degrees north of west (306-degree azimuth), or nearly northwest. Rain increased to a rate of 3.6 inches per hour. Air temperature in 10 minutes had dropped 5°F to 69°F. For one 10-second period on September 7, our anemometer recorded a gust of 67 mph, most likely during this five-minute interval. And most likely it was during this period that most of the damage occurred.

At 1:23 a.m., a 77-mph average speed over five seconds (which defines a gust officially) was recorded at Hancock Airport at a height of about 30 feet above ground. Normally wind speed increases with height, so maximum wind speed on campus was similar to speed at the

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airport. As for timing, a clock at the severely damaged New York State Fairgrounds is reported to have stopped at 1:20 a.m. Moving at up to 60 mph, as reported by the National Weather Service, the front would have moved from the Fairgrounds to campus in a few minutes.

During the next five minutes—1:24 to 1:29 a.m.—wind speed dropped to an average of only four mph, though our gauge recorded rain at a rate of 5.3 inches per hour. Wind direction shifted around to north-northeast. The sharp cold front that caused the high winds brought much cooler air; temperature was down now to 64°F. This pattern of high winds followed by very high rainfall rate is fully consistent with a sharp, rapidly moving squall-line front.

Between 1:29 and 1:34 a.m., rain tapered to 0.4 inches per hour, temperature was down a bit more to 63°F, 11 degrees lower than before the storm front hit. By 1:49 a.m., the rain was essentially over, and our sensors could detect little difference from the pre-storm conditions other than the dramatic difference in temperature.

Our rain gauge recorded a total of 0.94 inches of rain between 1:00 and 2:00 a.m. This is almost exactly the amount recorded by the weather station at Hancock Field (0.93 inches) which suggests that storm conditions were about the same on campus as at the airport, where hurricane-force gusts (wind speed greater than 73 mph) were recorded.

The patterns of wind direction and speed that we measured correlate well with damage on campus. For example, strong winds from approximately the northwest (the average 306-degree direction our instrument recorded during the strongest winds) explain the demolished London plane trees in front of Moon Library, the windows on the north of Baker and Jahn laboratories, and the loss of the hackberry trees in front of Marshall Hall.

Illick Hall provided shielding for the trees on that side of the quad. Wind was lifted and probably accelerated to speeds much faster than the 67-mph gust we measured as it flowed over Moon Library to hit the upper parts of the London planes and the hackberry trees. The Beaufort Wind Scale defines winds between 64 and 72 mph as a "violent storm," exceeding the "storm" category (55-63 mph winds); even "storms" cause "considerable damage" with "trees uprooted."

The highly damaged vegetation on the north side of Moon Library is exposed to the northwest. Winds should also have been accelerated in flowing around the southwest corner of Moon Library. The fact that the sugar maple there was mostly unscathed may attest to relative high durability against wind damage for this species, though the tree may simply have the vagaries of the chaotic turbulence in the wind flow to thank for being spared.

In most places where there is damage on campus (and in the adjacent community, as well), a glance to the west or northwest reveals an open wind fetch. Many trees in Oakwood Cemetery were blown over, most falling in directions between northeast to southeast. At the north end of Bray Hall, a 5-foot shrub was uprooted, partly because it did not have a very well developed root system, but partly because it was growing beneath tree crowns that directed fast winds to blow beneath.

Tall trees on the hill behind Marshall Hall were damaged, apparently by wind over the top of the building. Trees on the hill north of Walters Hall were severely damaged by winds coming across the expanse of the flagpole and other parking areas. Severe damage to trees on the hill below the Moon Library parking lot is predictable from the exposure of the site and the brittleness of most of the species there. Several spruce and fir trees on campus and many throughout the rest of the community snapped off high above ground because the crowns have high wind resistance creating large forces that must be supported by the single stem.

The small red maple tree we have been studying has shredded leaves, especially on the western side, caused perhaps by flying debris or hail, but it was otherwise undamaged. Similar-sized trees nearby were a little more exposed. Though no breakage occurred, their 2-inch stems have a persistent bend toward the southeast.

Although not designed to capture such an event, our instrumentation provided enough information to give us an interesting glimpse of this unique event.

Gordon Heisler is a meteorologist with the U.S. Forest Service Cooperative Research Unit based at ESF.

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