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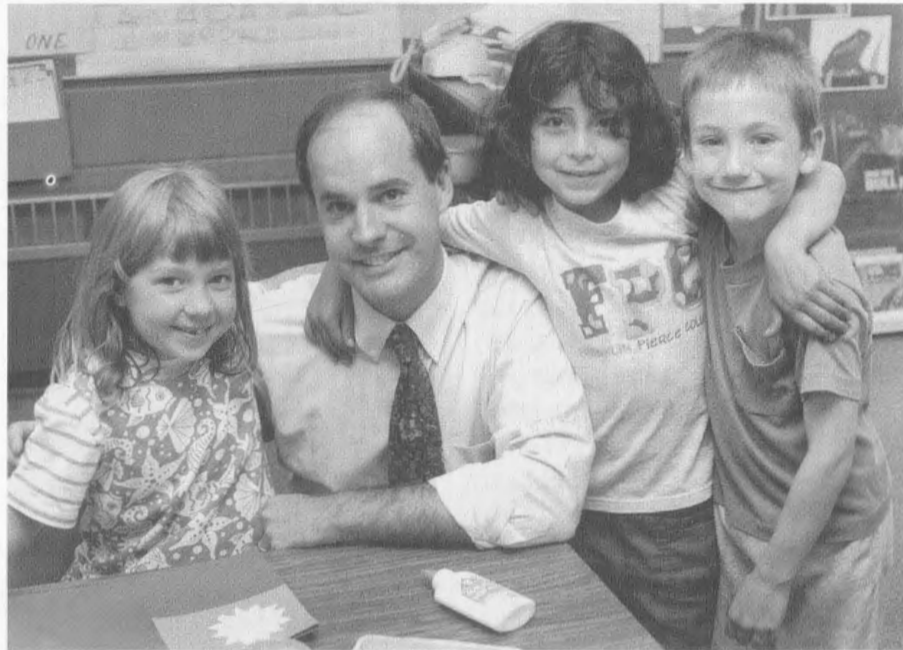
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UNIVERSITY OF NEW HAMPSHIRE

EXCELLENCE

Teaching ■ Research ■ Public Service



“At its best, teaching is
an invitation to question.
As a teacher, your role is
to create conditions
that promote inquiry.”

*Thomas H. Schram
Assistant Professor of Education*



Dreaming on the page

*September 8, 1990: One plain white sail far at the edge of the world marked the difference between sky and sea. I woke wife to wind, married like sky-blue to water-blue, human woman, wanting to be able to take joy in. Without apology.**

I had so many weird jobs to start with—peeling shrimp, typing, waitressing until three in the morning. But I kept writing because it mattered to me. Dreaming on the page—I let my experience tell me what it knows through writing a poem. It's about joy and about discovery, and it's relatively easy to do while you're peeling shrimp.

"Anything can start a poem, and once one gets started, more are usually hot on its trail. I carry my journal around all the time, and I'm always making notes. All day yesterday, for instance, there were petals from a flowering apple tree blowing through the yard. They looked like snow, and it was so beautiful. I'm probably going to write about that. One thing gets another going which gets another going, and suddenly I have six poems jammed into my pockets, and I'm working on all of them. When they're done, I just quit—it just stops for a while. But if it stops for too long, I make up some sort of exercise to get started again.

"For me, poetry is really about making a bridge to someone else, and I want to make sure that bridge is as sturdy as it can be. So I show new things to people whose judgment I trust, and I ask what doesn't work, where things become unclear. I know from experience—and this is the hardest thing to teach new writers—that even though it might all make sense to me, it might not make sense to you."

June 3, 1990: "They really be singing about the way they feel inside. Since they can't say it to nobody, they sing a song about it."—prisoner in Texas about other inmates singing the blues.

"A lot more people write poetry than ever admit it. It's this secret thing you do where you can say what you really feel. Especially if it's hard to say—if it's about loving somebody or feeling lonely or alienated. You can say it in a poem because there's a sort of spiritual history that says it's safe to put your feelings into this form.

"Even a kid who writes a rotten poem—a really rotten poem—gets something out of it. I had this student whose goal in life was to work at Hallmark; she told me that with great earnestness.

"She asked if I could help, and I realized it was what she really wanted to do. It would have been rude to turn her into Auden! So she left here feeling like she had accomplished what she wanted, and even that's pretty exciting."

August, 30, 1990: Show on Mother Theresa. For some reason, I always thought she was something like a milkweed seed floating around, gossamer and timid. But she's more like a tractor, going right in and doing what needs to be done. I felt like becoming one of her nuns while watching the show. It wore off. But her simplicity, her belief in love are tremendous. I can carry some of that into life without cutting my hair and wearing white hoods.

"My first teaching job was at Berwick Academy [in South Berwick, Maine]. I was twenty-three. I had never taught a class in my life. I was asked to come teach because Don Murray [former chair of the UNH English department] had met me once at a party and said he was certain I would be a good teacher. The English department chair at Berwick said he would quit unless someone came in and taught this class from hell. It was October, the semester had already started, and Murray said, 'Oh, McBride will be a great teacher.'



"A lot more people write poetry than ever admit it," says Mekeel McBride, associate professor of English. "It's astounding to me when these fraternity guys and potential nurses come in, and they have been writing for a while but have never shown it to anybody. Poetry matters profoundly to them, because it's where they can be truly who they are."

"So I got thrown into this class full of hellions. Part of how I learned to teach was just guerilla warfare. These kids threw each other out the window. They set fire to the school and brought the fire engines. They put snakes in my desk. They put snakes in my desk. I always could tell when there was a snake in my desk, because there would be twenty extra kids packed into the room.

"But those kids were wonderful. They had enormous energy. They were totally alive and funky and great! Finally, I understood: the snakes were a compliment. The snakes were love."

*Sections in italics are notes from McBride's journals, reprinted from *Taking Note: From Poet's Notebooks*, a special issue of *Seneca Review*, Hobart and William Smith College Press, Geneva, New York, 1991.

by Drew Sanborn, writer/editor, Office of University Publications

An invitation to question

Tom Schram does not assume the traditional professorial stance behind the lectern. He does not point to the blackboard and write the salient points of his lecture in sweeping cursive letters. To the uninitiated, picking out the teacher is impossible.

While some of his students perform their presentation on learning disabilities, he sits in a circle with the rest, decorated with labels learning-disabled children receive every day: lazy, irresponsible, inattentive.

"What I try to do," he says, "and have my students do, is have presentations that are participatory, that engage the class. I don't put them in the role of instructor talking to a passive audience."

Schram's students are anything but passive. The subject of life as a learning-disabled child comes alive in their hands. Within the space of one class, their audience has been visually and hearing disabled, physically challenged, and spatially bewildered by the world some children face every time they enter the classroom. Put in the role of the learning-disabled child, the audience is forced to reanalyze the labels these children wear.

"At its best," Schram says, "teaching is an invitation to question. There's an old aphorism that says: the dumber the teacher, the smarter the student. As a teacher, your role is to create conditions that promote in-

quiry. A teacher is not just a dispenser of knowledge; you shouldn't be afraid to let students see what you don't know. By blurring the distinction between instructor and instructed, you allow students an equal share in the educational process."

Schram began his first joint exploration in teaching back in 1978. Freshly graduated from Dartmouth with a major in Native American studies and education, Schram and his wife, Cindy, moved out to Wyoming and directed a residential outdoor education center in the mountains outside Yellowstone Park.

At some point, says Schram, he and his wife realized they wanted to have more involvement in public education. "We'd have these kids out for four or five days and wonder: what's happening with them the rest of the year?" They decided to become state certified and took their first teaching jobs at a two-teacher school in Linch, Wyoming. Population: 125.

"I talk to my students about how, in a small community, you reconcile your own interests

and ideals as a teacher with those of the community you're in. I'll say, 'This is what the community is like, this is what our resources as teachers were like. Now what do you see as the greatest needs, social and educational, of these students? What is the proper role of the teacher in this setting?'"

Schram and family later moved to a larger town of two-hundred-and-fifty people where he taught the fourth grade. From there he went on to graduate school, receiving first a master's in curriculum instruction with a focus on multicultural education and then a doctorate in educational anthropology. Since coming to UNH, he has never strayed far from the public classroom.

Schram says working with the public schools is a very important part of what he does. And although he feels very good about the collaboration between his department and the schools, he's concerned about the region's lack of diversity.

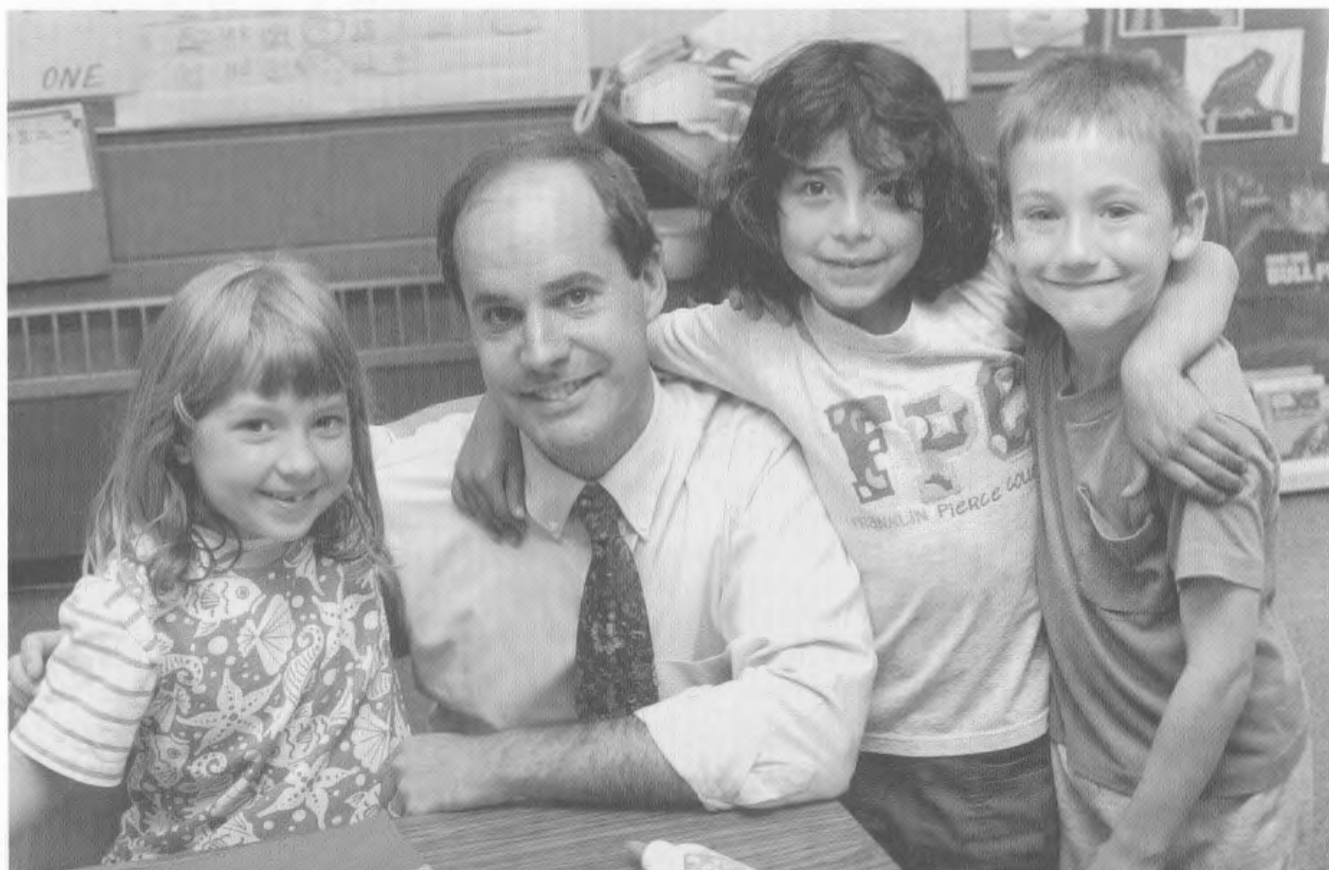
"By the year 2040 or so, minorities will be the majority in many public schools. While

it's hard to train people here for that—given this environment—it's important that we prepare them for the diverse world out there. The first couple of years I was here, I centered my research on my work with the Laotian population in Newmarket. I bring that experience back into my teaching. I also try to encourage international students at the University to be resources in the public schools. And last year we did some pilot exchange programs with inner-city Boston schools."

Between the teaching education program and his work in Newmarket, Schram's interests in education have turned full circle. He applies his love for multicultural education and experiential learning to the classroom, to research, and to life. The students he's invited to join him along the way should be regarded with hopeful anticipation. Who knows what they will one day invite us to question.

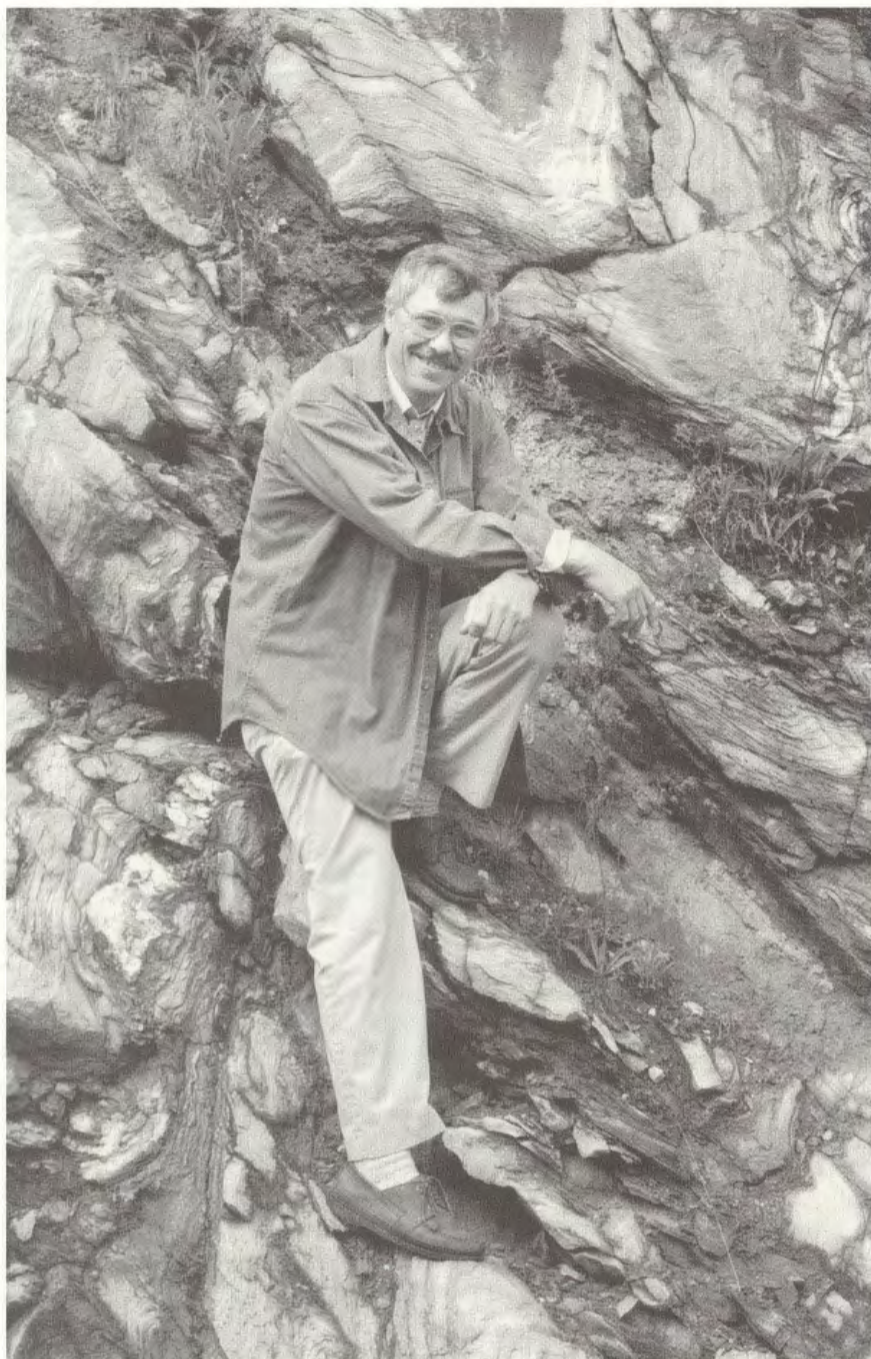
by Susan Warner Smith, writer/editor,
Office of University Publications

"I spend two full days a week in public schools," says Thomas Schram, assistant professor of education, "working with prospective teachers in year-long internship programs. Right now, I'm working very closely with students in Newmarket at the elementary school."



Wallace Bothner

Jean Brierley Teaching Award



Hearing the stories rocks can tell

Listen, in your mind, for a voice with the cadence of Jimmy Stewart's and the timbre of Walter Cronkite's, and you will recognize the voice of Wally Bothner.

There is another quality in this patient, deliberate voice. It communicates a deep, almost personal concern that the listener understand some of how the earth works. Wally Bothner knows you can see the world as you never have when you hear the stories rocks can tell.

"Have you ever had a Milky Way bar?" he asks. "Its thin

chocolate coating, over a layer of chewy caramel, over a punky nougat, make wonderful geologic analogues. Next time you have one, pull it apart slowly. You'll develop a series of steep tensional fractures in the outer, more brittle chocolate, and flatter planes in the thinning, more ductile caramel.

"The earth's crust behaves in a similar fashion when it pulls apart. In the upper ten to fifteen kilometers, the crust is very brittle. With depth, as temperature increases, the rock becomes more ductile, and structures tend to flatten."

"I do as much teaching as I can in the field," says Wallace Bothner, professor of geology. "It is very important, I think, for all of us to have a real sense of the field relations of geologic samples we study in class and in lab. We're pretty lucky to have so many excellent field examples nearby."

There's another nice thing about this analogue. "When you're done, you can eat the candy bar."

So it is with the layer cake and puff pastries and the host of other foods Bothner has used to whet the appetites of his students over the past twenty-six years. But an earnest student cannot live on analogues alone. Sooner or later you must do geology in the field. For Bothner, that's where it all started.

"Originally, I got into geology because I like being outdoors. I found my first fossils on a fishing trip in Maine with my father. Neither of us knew any geology, but that find was a big deal. I started wondering what sea shells are doing in rocks along the shore of the Moose River."

Later, when the Fitchburg, Mass., native was considering majoring in chemistry at Harpur College in Binghamton, N.Y., a roommate was going on geology field trips. Being outdoors seemed infinitely preferable to being in a lab, so Bothner switched majors, graduating with a B.A. in geology, in 1963. In 1967, after receiving his Ph.D. in geology at the University of Wyoming, he came to the University of New Hampshire.

Last fall, on sabbatical, he spent a month in the Himalayas, where mountains are being built by collisional geological processes thought to be similar to the ones that created New England's mountains some four hundred million years ago. He also spent six weeks working in Australia and, back home, helped finish the state's first new geologic map in forty

years. Last spring Bothner resumed teaching, culminated efforts to build an earthquake monitoring station at the University for teaching about seismic activity, and helped plan a coastal New England field trip for an upcoming meeting of the Geological Society of America.

Bothner has always included a field component in his courses, traveling with vans full of students for up to a week.

"I do as much teaching as I can in the field. It is important, I think, for all of us to have a real sense of the field relations of geologic samples we study in class and in lab. Then there's something to tie our data and interpretations to. At a minimum, it helps to have actual samples of folded and faulted rock to put in students' hands as evidence that rock really does deform that way. Better still: put students on the outcrops that demonstrate that particular feature."

Heading west out of Durham, stay on the Old Concord Road until you come to the stop sign at Lee Five Corners. Park under the Route 4 bridge, get out, and look around. Beneath the overpass and next to the eastbound exit ramp, the rock has a story to tell.

"You can see how the individual layers of the Eliot Formation have been wrinkled into a series of accordion-like folds. Those sediments were horizontal when they formed," says Bothner. When continents collided eons ago, mountains perhaps as big as the Himalayas rose up before the continents drifted apart.

"Think if you were to run on a hallway runner and put the brakes on. Take a look at the rug afterwards, and it will have deformed into a series of folds, similar to those at Five Corners or, on a grander scale, like the central Appalachian Mountains."

Who was doing the running?
"Probably Africa."

by Tad Ackman, writer/editor, College of Engineering and Physical Sciences

Ringling the bell of the Earth

Berrien Moore, director of the Institute of Earth, Oceans, and Space, can tell you a lot about the global environment, but first, you have to catch up with him. His office staff tracks him like radar tracks a fast-moving storm. Yes, he's in the building. He's in town. He's in the country. Just hold on a minute. He's with someone from NASA. He's running late. Paris is on the phone. He'll be with you in a second.

There are two secretaries in his outer office. Both are on the phone, one with an airline. "Can we switch the Atlanta flight to nine o'clock?"

The other is taking incoming calls. "He's on the other line. Can you hold? No, it's Brazil; it'll take a while." Between calls, she smiles sympathetically at a waiting visitor. "He's the eye of the hurricane," she sighs.

After watching the hullaballoo in the front office, you half expect Moore to come on like an oversized Texas millionaire with a bruising handshake and a deal in his back pocket. He does not. When you finally sit down to chat, he is calm, deliberate, and—in an unselfconscious way—full of enormous power—just the way things are at the eye of the storm.

"There is no question about it, we are changing the atmospheric concentration, absolutely no question. But scientific issues, like greenhouse gasses in the atmosphere, are very complicated because this human disturbance sits on top of the natural system. The two play together, and we are always trying to work our way down to the natural structure underlying this thing, the baseline dynamic, in order to better understand how we are changing it. The human factor has taken the system and tipped it a little bit. It's like ringing the bell of the Earth, and we are seeing how it responds.

"The probability of stopping or stabilizing greenhouse gasses is very difficult. I personally do not think it is possible. Stabilizing emissions of carbon dioxide and methane would require a lot of discipline and changes in current behavior in countries around the world. China and Russia, for instance, are struggling to get their economies going and their main source of fuel is coal which is very rich in carbon dioxide and methane.

"Even if you stabilize emissions, atmospheric concentrations will keep right on going up. That's something the politicians don't yet grasp.

"Suppose you have a bank account, and I give you six dollars, but you only spend three. Next year, I give you twelve, and you only spend six, and so on. If your spending is only a fraction of what I give you, and my rate of giving increases every year, your bank account will grow rapidly.

"But suppose I get tired of doing that and decide to just

give you the same amount every year. The bank account will still keep going even though I have stabilized my 'emissions' to it.

"And that's the problem. For every pile of carbon dioxide we stick into the atmosphere every year, only about half of it goes away. We are struggling with exactly what that fraction is, but roughly half stays in the atmosphere and half goes into the biosphere and then into the oceans. We have already made a considerable deposit in this atmospheric 'bank account.' We are already way the heck up there anyway—so we are not talking about getting greenhouse gasses to decrease.

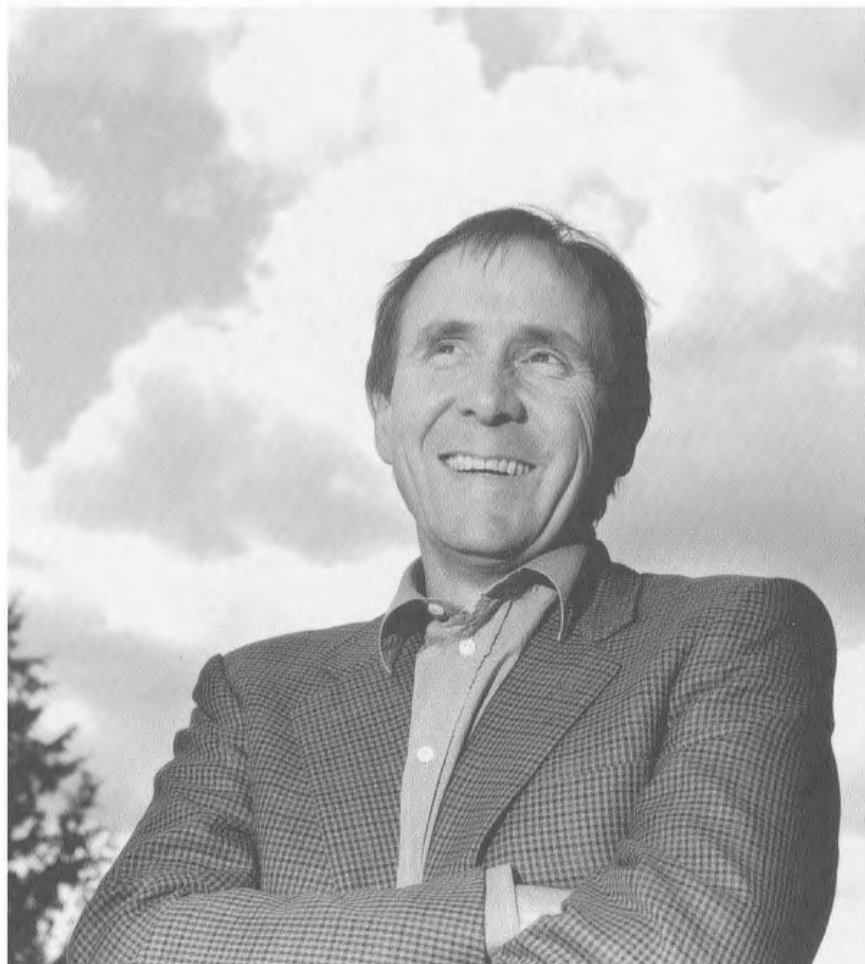
"I can't even get the atmosphere to go level. I wrote a paper that caused a big stir because I said that even if you cut carbon dioxide emissions in half—not stabilize emissions, but cut them in half—that the atmospheric concentration will keep right on going up. That bothered a lot of people; they

said I shouldn't have written the paper because it discourages everyone. I understand that, but I think we have not yet confronted the real issue. We have not yet understood the amount of cutting back that will be required to make a real difference.

"I believe you address policy issues by doing your science first. I think you make a better contribution to policy by presenting the science broken down three ways: this is what we know for sure; this is what we think we know; this is what we don't know. I am dead sure, for instance, that carbon dioxide has increased in the atmosphere from 1860 to the present. Will it increase in the next one hundred years? I think so. What effect will that have on the climate? I am not sure."

The meeting ends, and Moore opens the door to the outer office. Three people say "Berrien" all at once.

by Drew Sanborn, writer/editor, Office of University Publications



"The probability of stopping or stabilizing greenhouse gasses is very difficult," says Berrien Moore, professor of mathematics and director of the Institute for the Study of Earth, Oceans, and Space. "Even if you stabilize emissions, atmospheric concentrations will keep right on going up. That's something the politicians don't yet grasp."

The balance tips in his favor

Old-fashioned scientific balances aren't often used these days. In a way, that's too bad. There is a difference in what a modern scale and an old-fashioned balance can tell you.

Both measure weight with astonishing accuracy. But modern scales measure only in relation to their own peculiar calibrations. With a balance—two pans suspended by chains on either end of an exquisitely sensitive arm that turns on a nearly frictionless fulcrum—you put some combination of known weights in one pan and the thing to be weighed in the other. By adding or subtracting from either side, you move the pointer toward zero.

The balance shows equivalence. You could as easily use stones or jelly beans for your standard unit, but the balance will still show how the contents of one pan relate to the contents of the other. And it always shows both sides of the equation.

Russell Carr has a balance in his office. Though he keeps it there for an entirely different reason, the balance aptly symbolizes how this associate professor of chemical engineering goes about teaching.

How dangerous is a certain carcinogen? Well, what are your criteria?

Is one excess cancer death in a million acceptable risk? How about one in a hundred-thousand? And are you gauging risk using animal studies and trying to extrapolate results to humans? Or are you using a mechanistic model, like the degree to which bacteria mutate in the presence of this carcinogen? If you're going to examine something, on the one hand, you need to be able to examine what you're judging it against on the other.

Carr also teaches that "If you can't explain it mathematically, you really don't understand it yet." The power of mathematics is that you can use it to predict

outcomes, he says. "We have to do that today more than ever before. We have gotten to the point where we just can't go on doing experiments on ourselves and on the environment like we did with DDT and at Love Canal."

But Carr's balance is not there to remind him about teaching; it's there to remind him to continue learning both intellectually and spiritually. A slip of paper attached to the upright post of the scale bears the script *Mene Mene Tekel Upharsin*. It means, in part, "You have been weighed in the balance and been found wanting." Sharing shelf space with science books and equipment catalogs, two bibles and the book of Mormon, Carr's balance reminds him of his ongoing quest for spiritual truth as a member of the Church of Jesus Christ of the Latter Day Saints.

The fourth of seven children in a devout Mormon fam-

ily, and the father now of six, Carr grew up in Syracuse thinking he might want to be a saxophone player or sports-caster. Knowing his son liked math and chemistry, Carr's electrical engineer father recommended he look into chemical engineering.

"The other thing my dad used to tell me is that the name of the game when you go to school is you want to get in and you want to get finished, because otherwise you can spend your whole life fiddling around." His father died shortly after Carr graduated from high school. But Carr took the advice, enrolling in Brigham Young University and, except for two years of missionary work in France and Belgium, going straight through. He graduated *magna cum laude* in 1980.

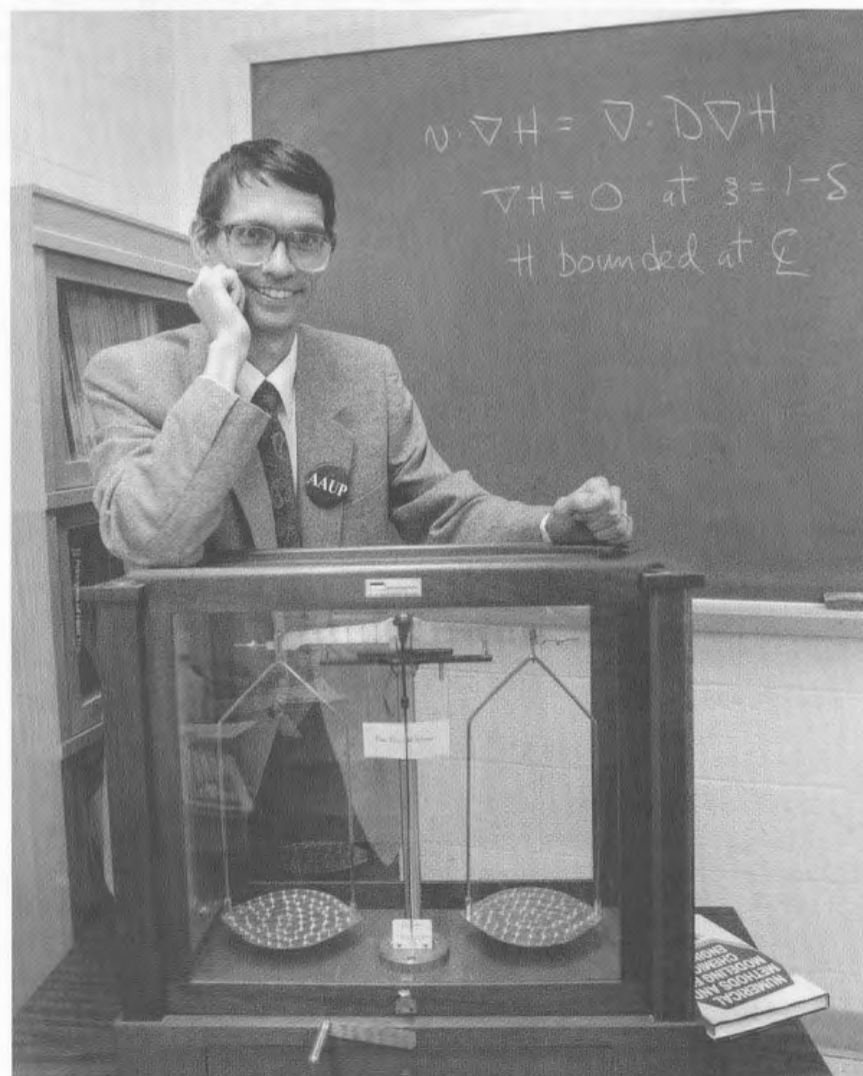
In the thirteen years since, the past ten at UNH, his research has focused on modeling

the flow of cells in blood vessels to answer questions about human circulation. Much of Carr's work has been done with support from the National Institutes of Health. He recently entered an agreement with Nashua Corporation and is advising them on the manufacture of copier toner.

His recent recognition as one of the college's best teachers has taken him by surprise, Carr says. But his colleagues understand. His students understand. They describe the slight man with large glasses and a familiar cowlick variously as fiery, personable, enthusiastic, knowledgeable, and amazing.

Whatever Carr may lack in comparison with the religious yardstick of his choosing, opposite the ideal of a university professor, the balance tips in his favor.

by Tad Ackman, writer/editor, College of Engineering and Physical Sciences



Russell Carr, associate professor of chemical engineering, keeps a balance in his office. A slip of paper attached to the upright post of the scale bears the script *Mene Mene Tekel Upharsin*. It means, in part, "You have been weighed in the balance and have been found wanting." The balance serves to remind him of his ongoing quest for spiritual truth.

Joan Ferrini-Mundy

Excellence in Public Service Award



Joan Ferrini-Mundy, associate professor of mathematics—"mathematics mom" to her children: Joey, seven; Beth, five-and-a-half; and Adriana, one—volunteers each week at the Mastway School in Lee. Her work with the National Science Foundation has carried her public service to the national level.

"We try to discover how to help students learn"

Joan Ferrini-Mundy volunteers one day a week in her seven-year-old son's classroom at the Mastway School in Lee, and even he acknowledges his mother's work. The week before Mother's Day last spring, Joey's class made cards for their mothers.

"Kids wrote things like, 'My mother is a flower' or 'My mother is a daffodil,' and then drew and colored flowers," says Ferrini-Mundy. "My son wrote, 'My mother is a mathematics mom,' and drew plus signs on the front of the card."

Ferrini-Mundy is the 1993 recipient of the University's Excellence in Public Service Award, and she has devoted her professional life to working with school teachers to improve the ways mathematics and science are taught in K-16 classrooms. Her outreach work began when she was a senior at Portsmouth High School and tutored mathematics students at the Portsmouth school she attended as a child.

"I basically pushed my way into the classroom," she says now. "And after that—well, I never stopped. I think it's an important place to be."

Ferrini-Mundy considers herself a broker between school teachers and mathematics methodology. "Teachers are professionals who have very difficult jobs. I don't go in and tell them how they can do it better. We try to discover together how we can help students learn."

Much of her public service with school teachers throughout the state is accomplished through the numerous summer institutes she has coordinated with mathematics and science colleagues at UNH. Her involvement at the local level has triggered schoolteacher participation at the national level.

"School teachers who have attended summer mathematics institutes at the University not only return to their classrooms more empowered, they have gone on to serve as national leaders in mathematics education. Many, many of them have

gone on to have great influence in the field."

Beyond methodology, Ferrini-Mundy also examines how the method of teaching mathematics affects girls; she works with teachers to promote female-student participation. Studies indicate that teachers subliminally encourage boys by asking them tougher questions. Girls generally are asked easier questions, and if those are too hard, they're "let off the hook" to avoid embarrassing them.

Other studies show that girls are better at cooperative problem-solving. Toward that end, Ferrini-Mundy says mathematics education is more and more moving away from "the drill" we knew growing up and toward more cooperative group work and problem solving.

"Writing and communication," she says, "is more hospitable to women, and that's what is being used in teaching—more discussions about problem-solving."

When Ferrini-Mundy was in the fourth grade, she took part in a special enrichment

program. Along with other classmates, she traveled regularly to Portsmouth High School and studied mathematics with a high school teacher.

What solidified her love for mathematics was high school teachers who cared about the subject and who encouraged her. By the time she was enrolled as a first-year student at UNH, Ferrini-Mundy knew mathematics was no mere hobby.

From 1989 to 1991, Ferrini-Mundy worked at the National Science Foundation (NSF), conducting, as she says, "public service at the national level. My job at NSF was to advise, oversee review, and make funding decisions for projects to enhance mathematics teaching, K through 12."

In addition, she's contributed book chapters and articles—has even had a spot on the Disney Channel—all promoting mathematics teaching.

"I do a lot of work in the area of teaching calculus," she adds, "giving numerous talks and workshops for college and high school faculty on this topic, in an effort to help improve the teaching and learning of calculus nationally."

Last spring Ferrini-Mundy was elected to serve on the board of directors of the National Council of Teachers in Mathematics (NCTM). She was president of the Association of Teachers of Mathematics in New England; serves as a mathematics adviser to the New Hampshire State Department of Education; and is president of Women in Mathematics Education, a national affiliate of NCTM. The list of public-service activities goes on and on.

So what does she do for fun? Where does she go on vacation?

Ferrini-Mundy, her husband, Richard Mundy, and their three children—Joey, seven; Beth, five-and-a-half; and Adriana, one—sometimes attend regional and national mathematics conferences.

That, she says, may explain Joey's card last Mother's Day.

by Kim Billings, director, University News Bureau

Keeping track of Rene Gingras

I don't think teaching is your calling."

The year was 1977. Rene Gingras had just finished his first year at UNH's Thompson School after a stint researching fruit genetics at the University of Arkansas. In Little Rock, he'd realized that, rather than do research, he wanted to teach.

The student tracked him down twice.

She told him after the course. She called him months later at home to tell him again that he should seriously consider another career.

Gingras took her comments to heart.

"I questioned it throughout the summer. I was nervous, and hadn't settled into a teaching style, and thought there might be something to what she said," says Gingras. "What made it worse was that I had already committed to teach an Elderhostel course full of retired professors that summer."

Gingras went to work. He sat in on classes taught by other professors, met with his department chair, and listened to the retired professors in his class. At the end of the summer course, the comments were vastly different.

The students revealed that they had learned from Gingras, and he had also learned what would become one of his guiding principles of teaching.

"I try to teach without letting them know it," he says with a grin. "I want them to relax, because the courses themselves are very demanding, and I don't want to create a threatening environment."

Twenty-five quizzes, four exams, a workbook, and a lab project a semester are standard in Gingras's courses in horticulture. While the workload itself doesn't exactly sound relaxed, Gingras's classes are distinguished by his thorough review of material and his openness to questions and dialogue.

"The quizzes and tests help them understand how much of the material they really do know," he says. "The labs come into play with people you think you're losing, or with shy people. Lab is often where lots of people will 'get it'."

Learning how to teach was one challenge. Feeding a growing family was another. Gingras started a landscape maintenance business on the side, which grew quite busy. Again, he was at a crossroads and spent time thinking and discussing prospects with his wife.

"Teaching took over," he says now. "I've never woken up any morning and regretted my decision. I don't consider this work. Even though I can teach the same course over again, it's always new to students. I really look forward to seeing them every fall."

Gingras is quick to point out that he isn't alone in this belief. "The Thompson School is like a family. Professors are

here because they want to be here, not for the finances. Most could make more money on their own. It's seeing students get excited about an idea, watching them learn how to work together."

He feels a particular spirit within the school. "Some people have the wrong idea of two-year education—they think it's easy, but actually it's hard! My students are only here for two years, and they need to learn as much as they can."

As he's talking, a student enters Gingras's office. She hands him a tape by Groove Child, a local band. They'd talked about rock during the semester, exchanged tapes, and learned about each others' generation's music.

The course is now long since over, but she's made a point of tracking him down.

by Cathleen Toomey, UNH Centennial coordinator, Office of Public Programs and Events

"I try to teach without letting the students know it," says Rene Gingras, associate professor of horticulture technology. "I want them to relax, because the courses themselves are very demanding, and I don't want to create a threatening environment."



The play's the thing

Late last spring semester on April 23, Shakespeare's 429th birthday, Robert Hapgood's students hashed out a difficult scene in *Measure for Measure*.

Does one's sympathy go with the sister, Isabella, faced with an indecent proposal to release her brother from prison, or with the brother, Claudio, condemned to death unless she accepts the nefarious offer? What subtleties of language would lead to this scene being performed as comedy or as tragedy?

Hapgood orchestrates the students' views and lets the balance hang in the air until he plays a video of the scene. Following a reprise of previous opinions, Hapgood releases a roomful of students still charged from discussion of the portrayal of the moral dilemmas.

As an early proponent of bringing theater into the classroom—"I think of myself as somewhat of a pioneer"—he was challenged to devise ways for students to study performance. He had to "blaze a few trails" technically. Recordings combined with publicity photos or tapes synchronized to slide shows—including Americanized versions, such as *West Side Story* and *The Boys from Syracuse*—were the best resources at hand in the days before video. "It's been a great godsend to have the video versions because they really do what I was trying to approximate."

Recognizing the difficulty of Shakespeare's language, Hapgood presents video productions early in the semester. "When the language is spoken by actors who really understand it, then communication can happen directly, and we can get the student to the human interest of the plays," he explains. "And then that makes it worth the hard work of learning the language. What was an initial obstacle becomes a final joy."

One of Hapgood's objectives is to build students' confidence

to a point where they feel free to express their thoughts and where discussion can take an impromptu shape beyond a mere understanding of the language.

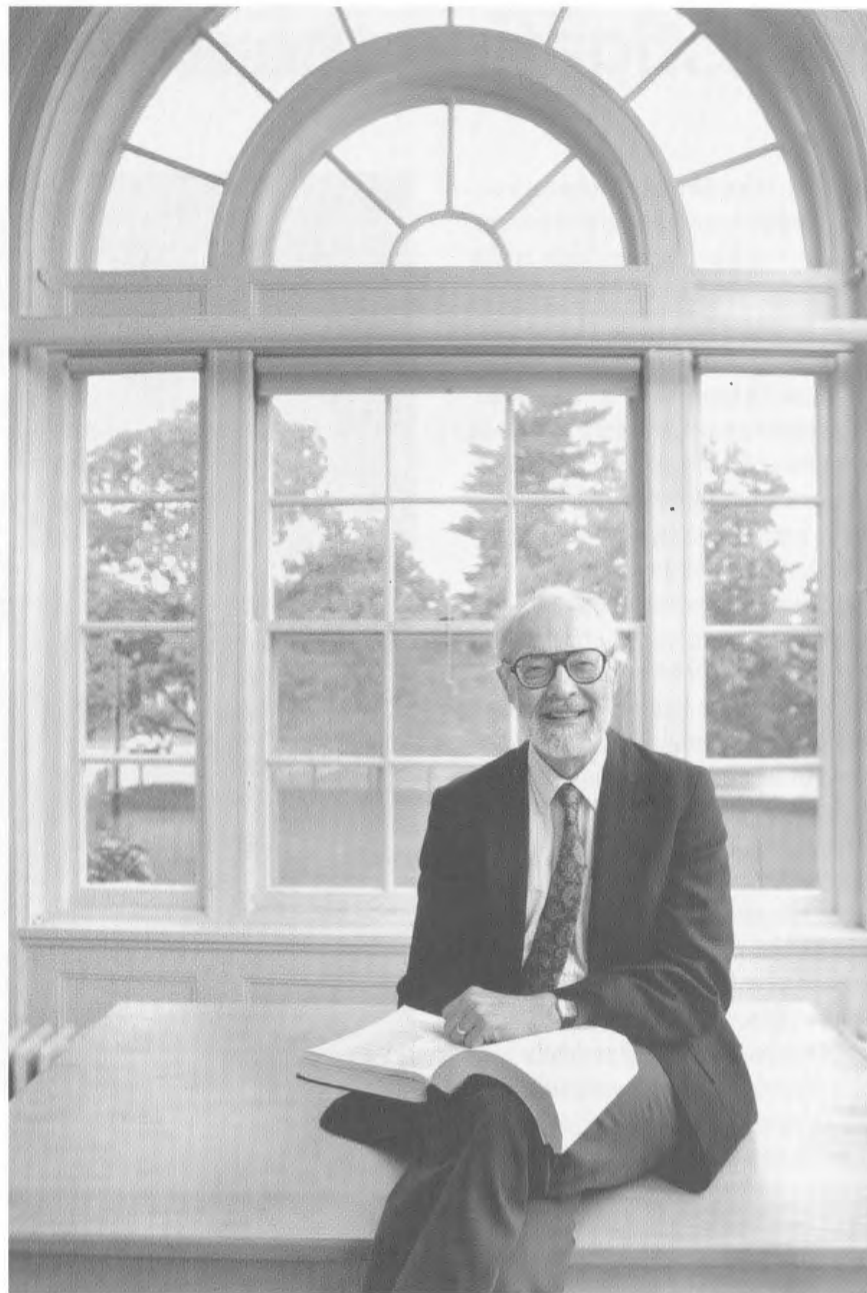
Hapgood was a swing-era piano player, and he finds the element of improvisation is also important for the vitality of classroom discussion. "That's what's exciting—when this plays against that, and that against this—the discussion goes places I have never anticipated or the students would never have thought before that particular moment."

When he began studying Shakespeare, Hapgood's approach differed from the prevailing thinking. He found that others talked as though there were only one right reading of each play. He believes he has helped to widen this view by suggesting that while there are wrong readings—"It's not just a promiscuous set of possibilities"—there is a variety of right ones.

Hapgood's concern with production became an important focus of his scholarly career. He decided he ought to be "as much at home in a theater as in a library, precisely because Shakespeare was so much a man of the theater." He made a special effort to enhance that aspect of his understanding of the plays, becoming "somewhat of a professional spectator."

Hapgood's book, *Shakespeare the Theatre-Poet*, explores the realm of Shakespeare's artistic direction and the interpretive limits—or lack thereof—for directors and performers. His upcoming edition of *Hamlet* will deal specifically with the play's performance interpretations.

With this exploratory approach, Hapgood finds Shakespeare ideal for classroom teaching because students come in spontaneously with a variety of readings. The classroom becomes a place for that variety to be "heard and tested and



As an early proponent of bringing theater into the classroom, Robert Hapgood, professor of English, was challenged to devise ways for students to study performance. He had to "blaze a few trails" technically. "It's been a great godsend to have the video versions because they really do what I was trying to approximate."

explored and developed." The students constantly introduce aspects Hapgood has never considered, even though he's taught these plays again and again.

"For an improviser from the swing era, that adds a lot of excitement to teaching, precisely because it's like a jazz combo. You have all of these voices coming in, playing standards that everybody knows, but what's done with those standards varies from one class to the next. I think that's a large part of what keeps the adrenaline flowing for me."

by Paula Noonan, writer/editor, Office of University Publications

Investigating the mysteries of life

Charles Walker holds up his hand, slowly separating his fingers. "It's truly amazing," he says. "Now these cells (pointing to the fingers) were programmed to live, and these cells (pointing to the skin between the fingers) were programmed to die. Why? The cells begin with the same basic genetic information, but somewhere along the line they switch to different developmental pathways."

It's one of the complex questions that has always challenged human understanding—how does a single cell differentiate and develop into a complex, multi-cellular life form? Despite intellectual and technological advances beyond our wildest dreams, this and other very basic questions continue to be a mystery.

Walker has been studying cell and developmental biology for seventeen years at UNH, yet he still gets excited when discussing the wonders of the fruitfly. And while he is working in a highly technological field which is uncovering new information at a staggering pace, he is still awed by the mechanisms of the cell cycle.

Walker teaches a variety of courses, including Principles of Biology and Eukaryotic Cell and Development Biology—a class referred to as "Cell Hell." The former is an introductory course required of all biology majors, while the latter deals with cutting-edge cell and developmental biology.

"The introductory biology class is a special challenge to teach because of its size," he says. "The key is to let each student know you care. Some kids are reached by the topic, others are reached by faculty enthusiasm."

Walker knows just how important that enthusiasm is. He says that while he has always been interested in biology, it was an instructor at Miami University in Ohio who inspired him.



"He was a great teacher; so enthusiastic," he says, thinking back. "I don't remember much about the class, but I remember him. He was Dr. Jim Haney. Imagine my surprise when I came to UNH and he was working down the hall!"

Walker hopes he has the same impact on his students. "You've got to give them the basic principles, but you need to present that information in a lively and relevant manner. Some students are mathematically oriented, while others are visually oriented. I use the SuperTech classrooms with slides and visuals—it's a powerful learning technique."

Along with visual imagery, Walker believes that laboratory work is essential. "What makes UNH special is that undergraduate students have the opportunity to work on sophisticated research with many professors. Working in the laboratory is an exciting way to learn biology. Science becomes real to students because they can see things happen."

Walker has several students working in his lab, where he studies marine model systems—most notably spermatogenesis in the sea star and leukemia in the long-neck clam. His research, funded by the National Science Foundation and the National Institutes of Health, provides the groundwork for scientists at other institutions working in such areas as reproductive and cancer biology.

"At a certain level, cells are all similar, whether you're working with yeast, sea stars, or humans," Walker says. "Take the sea star, for example. While it has all the necessary genes, it doesn't get gonadal cancers, while clams and humans do. Why? Also, concerning spermatogenesis, the basic process is virtually the same as that we see in other animals, including humans. There are implications for male contraception if we can continue to identify the factors that control it."

"Biology is an exciting field and it is changing so rapidly," Walker says, adding that his

Charles Walker, professor of zoology, teaches introductory biology, a course required of all majors. The class, he says, is a special challenge because of its size. "It's difficult to reach all students, but you try hard because this is their first taste of the field and you want to get them excited about it. The key is to let each student know you care."

own college biology texts are so out of date, they're practically useless now. "There are dozens of questions being answered every minute by so many bright people working in the field. It's rewarding working with students and seeing them grow, as well as experiencing my own growth trying to perceive things not yet known."

by Sharon Keeler, writer/editor, University News Bureau

Seeing children in a social context

Psychologists used to just study children in their labs." She says this wryly. "You know, bring kids into a lab—this sterile university environment—and poke them and prod them and try to find out something about child development."

She pauses, briefly. "I think it's more exciting and informative to study children in a social context. In my case, the two contexts that I've been interested in are the family context and the child-care context."

Kathleen McCartney is a social developmental psychologist whose specialty is large empirical studies. Currently, she's part of a research team, one of ten teams, working on a National Institute of Child Health and Human Development five-year longitudinal study on 1,200 children and their families. The purpose of the study is to examine under what conditions children are placed in child care, the problems that might arise, and the ultimate prevention of those difficulties.

As a psychology professor teaching child development, McCartney's first goal is to get students used to the discipline

of scientific thinking. And that means, because many of the studies in the child development field are nonexperimental, learning how to analyze those studies in a very complex way.

"One of the things I say to my students during the first class is, if they want to appear really smart, they can answer every question by saying, 'It depends.' So, if I ask, 'Does day care disrupt the mother/child bond?' They should say, 'It depends.' And then they should think about what it might depend on. For example, does the mother have social supports, i.e., other family members nearby? Is she a single parent? Are the day-care teachers sensitive and responsive?"

Yet, even accounting for a variety of moderating variables, research has been consistent enough in certain areas of child development to be termed conclusive. McCartney refers to those areas as "oases of knowledge."

Rob Pedini, a senior English major who took McCartney's Child Development course was encouraged to learn that children have no idea about stereotypes unless they're conditioned by their parents or environment.

"Knowing that gives me hope," Pedini says. Other "oases of knowledge" include the ineffectiveness of spanking as a disciplinary measure and the fact that siblings often have disparate impressions and expectations of family life.

McCartney invites students in her classes to work in her lab. Many, having gotten a taste of research from her courses, take her up on the offer. Mentoring is the work she enjoys most.

"In my lab, there's a blend of teaching and research. Am I teaching or doing research when a student and I develop a measure together or a videotaping coding system? We're learning together while we're doing research," says McCartney. "I strive for that blend in my teaching, too."

Keith Beauregard worked with McCartney on his senior thesis—a two-year project—and was voted the University's outstanding psychology student in both his junior and senior years. Currently he works in a community mental health center and plans to go on to graduate school. "She saw a lot of potential in me that I didn't know I had. When I received

recognition for my work, I became more confident and sought more challenges.

"I apply the analytical methods that I learned as a psych major to the work I do now. It's just automatic for me to think about how the community structure is related to a given person's situation."

McCartney also applies her expertise to her community at the University. Since she came to UNH in 1987, she has volunteered to serve on a range of committees.

For three years, she served on the student conduct board committee, the last year as chair. As a member of the planning committee for the University's Child Study and Development Center, she helped develop a sliding fee scale to ensure that the center could serve the broadest spectrum of UNH families, providing the diversity important for students and research. In addition, she is on the University's research advisory board and is a member of the biomedical research support group.

"I enjoy working on committees," she says, "because it makes me feel connected. I really appreciate having the opportunity to participate in the governance of the University."

by Carrie Sherman, writer/editor, Office of University Publications



Kathleen McCartney, associate professor of psychology, believes university laboratories are not ideal places to study child development. "I think it's more exciting and informative to study children in the social context," she says. Her own children, Kaitlin, 11, and Kimberly, 8, "have taught me a lot about child development. Certainly, my experiences as a mother have informed my research."

Linking education and entrepreneurship

What do you look like? Give me some rough idea."

Bill Wetzel is on the phone arranging a lunch date with a would-be entrepreneur driving down from Portland. His quiet, McConnell Hall office overlooks pine trees and blue sky. His sports coat—tan corduroy with elbow patches—is hung on the back of his door.

Two years ago, Wetzel received the University's Public Service Excellence Award, primarily for his work finding sources of capital for shirt-sleeve, upstart entrepreneurs, people who might know a lot about boot straps and hard work but little about finessing financing.

This year's award is for his teaching, a more gratifying recognition, says Wetzel, since he left a successful career in banking to enter academia.

"Uh-huh. Sure," he finally grins at the phone. "OK, then. I'll look for an ugly coyote from Colorado."

After serving in the Air Force during the Korean War, Wetzel started his career as a commercial bank officer in Philadelphia. "Most of my client entrepreneurs were working

on the waterfront," he says. "They were creative, hard-working people who knew what they wanted to do. I felt I was doing community service helping them get their businesses off the ground.

"What happened, though, was, I kept getting promoted, and began spending less time with entrepreneurs and more time entertaining the treasurer of Dupont at the ballgame or golfing."

In the meantime, at thirty-five, he was serving on his local school board, while teaching commercial lending, and working toward his M.B.A. at Temple University at night.

"It dawned on me that I was getting a lot more satisfaction out of the education part of my life than the banking part.

What prompted my career change was a real sense that teaching was accomplishing something worthwhile—it really got my adrenalin pumping.

"The field of finance is the thread between banking and education," Wetzel explains.

"There are similarities in approach between education and entrepreneurship."

So he quit to enter a Ph.D. program in business at the

University of Chicago. "I came here in 1967, and I've never regretted it. The Whittemore School was just getting started and it was a chance to get involved with that."

In 1969, he and a colleague put together a course in entrepreneurial management, one of the first in the nation. In 1984, he formed the Venture Capital Network, one of the University's highest-profile public service enterprises, for which he was recognized as the faculty's innovator of the year.

From the bottom of a filing cabinet he pulls a vita resembling that of a captain of industry: "... a founding member of the New Hampshire High Technology Council [from which he recently received a Lifetime Creative Vision Award] and a past President of the Council. Professor Wetzel also serves on the Boards of Directors of Yankee Equipment Systems, Inc., C.I.M. Industries, Inc., M.I.T. Technology Capital Network, Inc., New Hampshire Business Development Corporation. . ."

And somewhere under a pile of papers on Wetzel's desk is a recent letter from Dale Nitzschke, who had run into a former student of Wetzel's in

New York. Now successful on Wall Street, the student wanted the president to convey his warm regards to his old teacher.

"The fun part of teaching," Wetzel says, as though talking again about his shirt-sleeve entrepreneurs, "is getting to know students as colleagues. They're all interesting, multi-dimensional, talented people."

His emphasis in teaching is entrepreneurial: showing students how to *use* information, on developing a sense of where information can point.

"My focus is on interpreting data," says Wetzel. "The whole rationale for education in general is to enhance decision making, whether the decisions are scientific, political, literary, or artistic. The real test of education is whether it helps you make decisions."

by Louis Mazzari, writer/editor, Office of University Publications



William Wetzel, professor of business administration, brings to his teaching experience gained on the boards of directors of numerous corporations, among them, Yankee Equipment Systems, Inc., of Barrington, whose president is a former student. "The real test of education," says Wetzel, "is whether it helps you make decisions."



"When I decided that I wanted to teach, it was partly because I envied my really good professors," says Neil Vroman, associate professor of physical education. "They had an impact on me. It's not that they taught you, but that they egged you on to want to know. You were almost tricked indirectly into understanding."

them almost the way he would with a peer. Vroman flips the switch on, tells the computer, "Wake up!" Soon the computer is word processing a letter—all by voice command. "Some colleagues and I are working on a vocational rehabilitation project using technology to help people with disabilities get back to work. . . . We have a couple of clients who are quadriplegics and with this kind of machine, they can hold jobs. . . . Technology can be useful to us at all stages in our lives. Even if it's just a hearing aid."

For Vroman, demystifying science for students taking his General Education course is a serious challenge. "We do laboratory hands-on data collection. They actually enact, in a way, what a scientist does," says Vroman. "I think science is amazing. I like doing it. I like learning about it, and I love teaching it. One thing I try to convey in my course is how the structures of all parts of the body are uniquely designed to suit their function."

When Lisa Tokatlian was asked if the Biology of Aging course was useful, she laughed. "People always say Gen Eds are useful, but I *really* feel like I'm coming away from this course with a lot of information. I have a grandmother, and my parents aren't getting any younger. What I liked was that he doesn't lecture. He tells stories."

by Carrie Sherman, writer/editor, Office of University Publications

That's what you think

At the beginning of the semester, students shuffle into Neil Vroman's Biology of Aging class. They settle into their seats and gaze around the room—a couple of windows, a blackboard. They've had to be aggressive to get into this class. The word is out, Vroman is good.

And then he comes in. This red-haired guy who doesn't stop moving or talking, and he's asking someone what they think of when they think of old age. The class humors him—they tell him that old people walk slower, forget stuff, can't hear or see that well, their hair is gray, and they have wrinkles. Ugh. The silence that follows is sad and guilty. Basically, he says, Okay, that's it, that's what you think. But, he asks, "Are there components to some aging stereotypes that might not be due to the aging process?"

Vroman grew up in a small town of two thousand in up-state New York. At Colgate, he was premed and determined to become a physical therapist. After working as a PT for several years, though, he was drawn

back to graduate school and got his Ph.D. in physiology. He continued with a post-doc at Johns Hopkins, working on cardiovascular research.

Midsemester. Vroman's classroom has become a cell. The students move around the room holding pieces of paper that identify them as either DNA, transfer RNA, ribosomes, or amino acids. A big piece of rope winding around the middle of the room represents the nucleus. As the class mixes, a transfer RNA might grab onto the arm of an amino acid and pull it over to a ribosome and line it up. Their laughter is tinged with relief, because they are learning to question the fatalism of that catch-all phrase, "It's genetic." They've heard it all their lives being used to describe everything from teeth to hearts. But now they know that the body is doing genetic repair work all the time.

Last class. Several students record a classmates's baseline resting parameters—respiration rate, blood pressure, and heart rate. Then Vroman asks the student to walk in place and the

same measurements are taken again and compared.

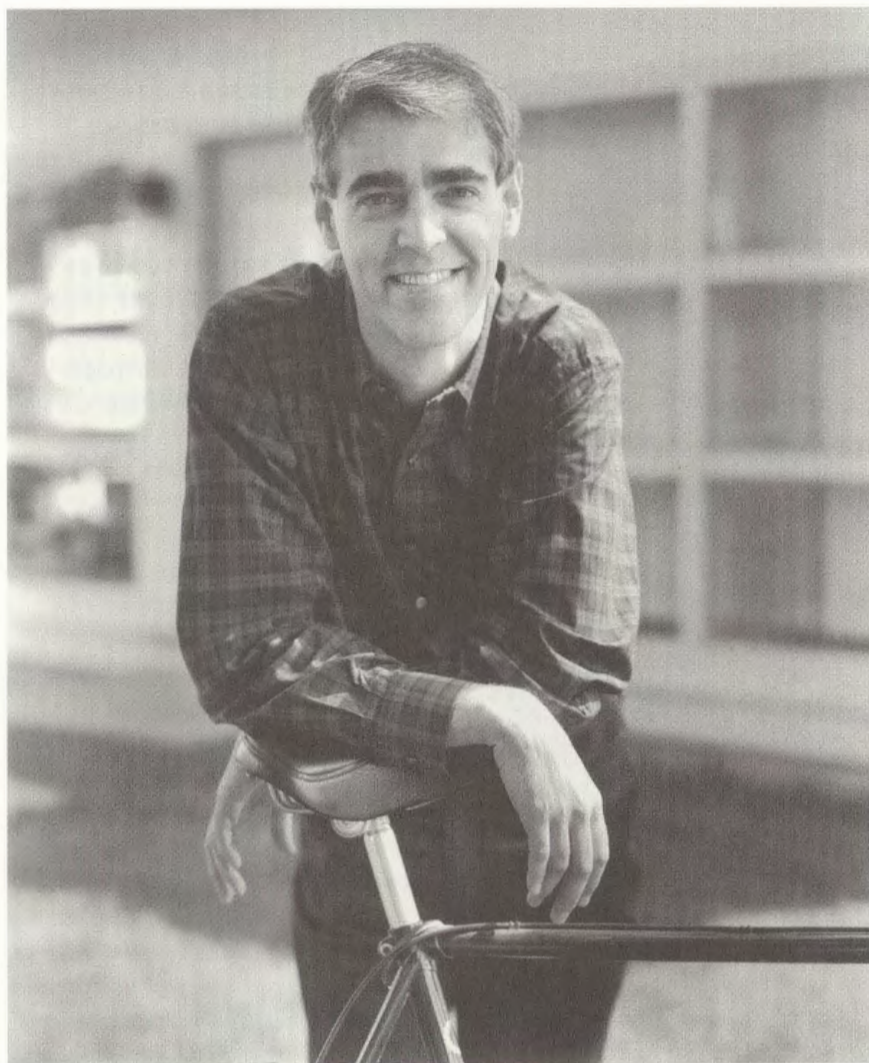
"The minute you start exercising, your blood flow has to increase and go to your muscles. . . . Anybody remember how efficient the body is?" In the back someone answers, "Twenty to twenty-five percent efficient." Vroman nods. "Right. So, seventy-five percent of that energy is given off as heat and the body sweats to keep cool. As we grow older, maintaining homeostasis becomes increasingly difficult. But if you have an active lifestyle, it's remarkable how long you can maintain." He goes on to underscore a major point of the course—the difference between studying a healthy population of older people and those with disease. In other words, it's important to attempt to separate out true, age-related biological changes.

"Hey, I want to show you guys something."

Vroman sits down at a computer. Everyone gathers around. The final is looming; they all have questions—but this is neat. And it's what they like about Neil; he engages with

Edward J. O'Brien

Teaching Excellence Award, College of Liberal Arts



The world of connection making is the universe of Edward O'Brien, associate professor of psychology. He helps students understand how to draw conclusions by fitting together unintegrated pieces of information. "You set them up to make the connection. That's what good teaching, for me, is all about."

The Aha! moment

In the basement of Conant Hall, three psychology graduate students hover impatiently outside Ed O'Brien's door. They're being polite. Usually they saunter in, whether he's busy or not. They feel right at home with O'Brien, who has a reputation for being readily available to a student in distress.

"What the formula for a t-test?" one man shouts nervously. His accompanying laughter rings down the hallway.

O'Brien motions toward the door. "Can you believe he actually called me at home last night to ask that?"

After the students drift away, it seems only logical to ask, Doesn't this kind of traffic through his office make him crazy?

"No," he says, "it's actually the standard around here, and I kind of encourage them. If I find that they get excited or in-

terested in something, I don't want to do anything to discourage that. Plus there's a lot of benefit to me. Their interest is contagious—we both end up getting a lot more done.

"On the graduate level," he says, "I'm supposed to train them to question research, to reach the point where they can operate independently and will have the self-motivation to go on. What they learn from me will have to stand them in good stead."

What exactly does he teach them?

"In graduate-level statistics, I use examples from different areas—personality, cognition, or development—to give them something to latch on to. At the undergraduate level, we begin by doing all the statistical analyses by hand; it gives students an intuitive feel for a test. I want them to see the connection between the distributions

they generate and the ones a computer generates."

The world of connection making is O'Brien's universe. Coming from a scholarly background that combines memory and psycholinguistics, O'Brien is currently involved in analyzing reading comprehension.

"Most of the models of reading comprehension over the last fifteen years have been so-called local models. In other words, if what you're reading fits with the immediately preceding sentence or two, the text is considered coherent. I've been arguing that readers attempt to find coherence at both the local and the global level.

"Say you read a passage about Mary, who is a vegetarian. After about fifteen more sentences, Mary goes to the mall with her friends; they shop. Obviously the focus is no longer on the fact that Mary is a vegetarian. But now, if Mary

goes into a restaurant and orders a cheeseburger—Bam! You're stopped cold. Your reading time slows way down. If all you're doing is maintaining local coherence, there shouldn't be a problem. Mary walks into a restaurant, sits down, talks to the waiter, orders a cheeseburger. So what's wrong with that? What's wrong is that something happened much earlier at a global level and it's producing an inconsistency or incoherence that needs to be resolved. Intuitively, it's obvious that reading comprehension works at both the local and the global level."

O'Brien's belief in global coherence is so strong that he often relies on it in his teaching.

"Good writers continually make references to information they've mentioned before. It works in class as well. I keep reminding my students, 'You remember when we talked about X?' And I'll help them see how this information fits with information from two or three classes ago. Eventually, you begin to see the dawning comprehension on their faces. They get this sort of 'Aha!' experience. You set them up to make the connection, to generate the kind of experience anyone gets when they connect two pieces of

unintegrated information together. 'Oh, yeah,' they say. 'Now, I get it.' That's what good teaching, for me, is all about."

The student who called about the t-test wanders into O'Brien's office as though he lives there, and spies his paper on the corner of O'Brien's desk. The paper is covered with penciled comments.

"Can I, like, take this home and look at your comments?" he asks.

"Sure," O'Brien says. "I'll be happy to go over it with you later."

"Can I call you at home tonight? You'll be around, won't you?"

O'Brien shrugs. What can he say? Yeah, he'll be around.

*by Susan Warner Smith, writer/editor,
Office of University Publications*

Increasing her word power

Cynthia Gannett's fascination with words began as a child, when she named her two beloved dolls Polio and Diarrhea, after interesting words she had heard from adults.

"It's a tribute to my parents that they didn't say a thing," she says now.

Language has always been Gannett's prized possession. She has a love of—or more accurately, delights in—language. Her eyes brighten, the corners of her mouth turn up, and the words, the phrases, the sentences come rolling off her tongue. And she is very matter-of-fact about her mastery of the language. "People who work with words should know the *inside* of words, like others know the inside of people."

It is a mastery she tries to convey to her students, for Gannett believes that language is power, and can be a useful

tool or a cruel weapon. Words can be used to win supporters or make enemies, and they can make us socially acceptable or social outcasts.

Even before she could speak, Gannett learned the power of words, in this case, the power to soothe.

She was a fussy baby and her father—a writer and a public relations man—would take her into his study and, sitting baby Cynthia on his knee, would work on his writing into the night. In a recent essay, Gannett recalls, "I think my earliest sense of pleasure with language and literacy must have started here, before I could walk, long before I could name the pleasure."

To keep his daughter occupied, "Daddy would declaim, recite, soliloquize, philosophize. Everything was fair game: he chanted the lofty and passionate words of the Declaration of Independence and the preamble to

the Constitution, the Gettysburg Address and Mingo Chief Logan's eloquent 1744 speech at the end of Lord Dunsmore's War. . . . These would be interlarded with bits of Ogden Nash, slices of Lewis Carroll's 'Jabberwocky.'" If these failed to soothe her, she notes, her father would recite "The Nomenclature and Assembly of the M1 Rifle," a monotonous recitation learned during his service in World War II.

"I imagine now a short, plump baby with attentive, not quite sleepy eyes, awash in words that roll into her brain like the steady sweep and break of the tide," Gannett writes. "I imagine a young man enjoying his ability to make a baby respond with equal delight to the Declaration of Independence and some Ogden Nash fru-fru about a fertile turtle."

It is this response Gannett tries to elicit from her students. Years later, a fussy baby grown into an exacting associate professor of English, Gannett tries to relay her love of words to her students. "The wonderful thing about words is that they're public property," she points out, "but students sometimes think words belong to other people." She encourages her students to investigate word origins, thereby becoming familiar with a particular word's history.

Becoming familiar with their own history is another goal Gannett sets for her stu-

dents. She teaches a course on women's diaries and journals, and their study as literature.

These journals need not be the work of famous women of literature, she explains to her students. She encourages them to bring to class their grandmothers' or mothers' diaries. It is these works that uncover family histories, litanies of daily chores, and cherished memories of special events.

Gannett has kept journals since she was young. Her current book, the size of a standard notebook, includes her academic planning for the coming semester, a Mother's Day note from her daughter, and her random thoughts. Scraps of paper, from letters to newspaper clippings, are kept in the inside cover.

Her entries are sporadic, and she tries to avoid a daily log of what she did a particular day. "I don't know if I'm a 'chronicler,'" she explains. "I haven't lived that kind of life yet."

Gannett believes, however, that journals—call them diaries, daybooks, whatever—may simply serve as keepers of memory. She received her first diary at age thirteen, and she still has it. "I love being in touch with that boy-obsessed, homework-obsessed little girl."

Even now, as a grown-up, Gannett finds she needs to record her thoughts. Life can be hectic, she points out. "There's little time built in for reflection, very little 'empty' time. The journal makes us confront ourselves."

When she completes a book, she tries to re-read sections, or the entire work, then writes a reflective piece on her impressions of past entries. "Journals provide opportunities for self-reflection, for developing ideas, and for uncovering patterns of experience, says Gannett. "If the habit becomes valuable to students, they will become lifelong learners."

by Carmelle Druchniak, editor, Campus Journal, University News Bureau



For Cynthia Gannett, associate professor of English, language has always been her prized possession. It is a mastery she tries to convey to her students. "The wonderful thing about words is that they're public property, but students sometimes think words belong to other people."

James Malley

Assistant Professor Outstanding Faculty Award

Environment and the human factor

The term *hazardous waste* has caught on. It's glamorous."

When Jim Malley began teaching the course, Hazardous Waste Management, in 1988, he had eighteen students. In spring of 1993, the class enrollment was fifty-one. "The numbers have mushroomed. I'll take some credit for that, and the name will also take some credit. It's exciting," he says. "I'm putting my environmental mark on these people."

Among "Malley's people" right now, the motto is "shit happens." Recently, Malley and his wife Joyce had a group of grad students over for dinner, and that was the joke of the evening. "You have to keep morale up somehow," he says, "because a lot of what we do doesn't work out. It just doesn't. We're trying to push the envelope, do things others didn't do."

Most of Malley's students are seniors and grad students. Many of the latter are back at school after being in the work force. While he finds the seniors and people fresh out of school energetic and vibrant, the older students are more resilient in accepting the inevitable disappointment.

One factor students must acknowledge in environmental engineering projects—whether the scale is gigantic or small—is the human factor, the public perception. Two projects under Malley's supervision give a sense of the scope of the relationship between research and real-world needs. One is for the city of New York, which is building a 400-million-gallon-per-day plant to produce clean drinking water, "a monster plant." Malley and his students are showing the city that ozone can be harnessed to treat the water, not only to remove discoloration, but also to kill pathogens.

On the opposite end of the size spectrum is a project for the state of New Hampshire.

Malley's group investigated fifteen sites where gasoline from corroded underground storage tanks leaked into the groundwater and thus into people's wells. The surprising thing to Malley, and something he reiterates to his students, was that a site could "look so pristine. How could it be grossly contaminated with fuel?" The state was buying homeowners bottled water for drinking, but many were still using well water for noncontact purposes, such as showering and laundry. People were being exposed to substantial doses of unhealthy compounds, including benzene, through inhalation. In some cases, Malley says, the situation was "heinous."

Malley's group built "point of entry" treatment units for each home. Using air-stripping methods, sometimes combined with an activated charcoal phase, contamination became undetectable. People were able to return to use of their water and the state could phase out bottled water use. "So I think everybody was winning. But not all research ends that way."

Malley admits that not even this solution was ideal. It did not address cleaning up the primary site of contamination. In addition, it meant homeowners were responsible for treating their own water and making sure the equipment worked properly. Not all were diligent. "The down side was the human factor. So our recommendation to the state was, yes, these are good short-term answers, but keep striving for that clean water supply."

One project Malley is keeping an eye on is Boston's engineering study for a drinking water treatment facility. One technology being considered is dissolved air flotation, in which micron-sized bubbles remove contaminants. This technique was Malley's initial specialty, and he's excited that it may "come back into vogue."



James Malley, assistant professor of civil engineering, says the "human factor" has counted heavily in his career, both professionally and personally. His family, he says, has helped him tremendously, as has the University's Environmental Research Group, a faculty collective that addresses current environmental problems.

Malley feels lucky to be able to switch research gears successfully. He makes it clear that his family—Joyce, Brian, and Shannon—is the reason he's accomplished what he has at UNH. And when he speaks of his students, one gets the sense that his "family" has grown beyond that crucial core. He also credits the encouragement and liberties his department colleagues were willing to give a newcomer, as well as the inspiration of the Environmental Research Group, which addresses current environmental problems. "They've really helped spur me; you see such enthusiasm and success. We all seem to have a love for what we're doing and a desire to do it well. I call it the peer pressure to be excellent, to do the best I can."

by Paula Noonan, writer/editor, Office of University Publications