2006 Summer Research at Bowdoin
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Like many of us, I suspect, Bowdoin faculty anticipate the end of the academic year and the arrival of longer days and summer weather. While the beauty of Maine and well-earned vacations beckon, what these scholars and artists most eagerly await is the opportunity to return full time to the lab, archive, or studio, to be re-immersed in the half-finished manuscript, to undertake at last the analysis of an academic year’s worth of data collection. Increasingly the faculty’s anticipation of summer research is shared by Bowdoin undergraduates. This summer the campus and its surrounds were alive with student researchers working alongside faculty in intensive study and fieldwork across the disciplines.

The high-level research of these students and faculty underlines the academic mission of the College and its commitment to fostering close faculty-student relationships, one of the hallmarks of a Bowdoin education. For many students, summer research is a life-changing experience, inspiring them to develop honors projects or continue on to graduate school. For all these students it offers a taste of exploring complex issues and applying their skills to challenging problems. Because they are honing their skills with real-life research, they have the satisfaction of knowing that their contributions matter. In fact, many articles by faculty members appearing in professional journals have been coauthored by Bowdoin students, and dozens of students have presented at national meetings as a result of their summer research experiences. There are dozens of prestigious grant and fellowship programs that support our students in this work each year.

In 2005–06, Bowdoin faculty continued to receive major private and federal support for their work as scholars, researchers, and teachers. The list of supporting agencies and foundations is long and prestigious, including all major branches of federal support (National Institutes of Health, National Science Foundation, National Endowment for the Humanities, and NASA), the Guggenheim Foundation, the Howard Hughes Medical Institute, and National Geographic. This level of funding support is a distinction that makes Bowdoin one of the most active research institutions among liberal arts colleges today—and students play important roles in much of that research. With the academic year now in full swing, I invite you to read about some of the extraordinary work by Bowdoin students and faculty that took place during the summer of 2006. I’m sure that you’ll be both intrigued and impressed by the range and quality.

Cordially,

Cristle Collins Judd, Dean for Academic Affairs
oby Crawford ’07 got his first glimpse of Harpswell’s famous cribstone bridge from a sea kayak during his pre-orientation trip. He returned to it this summer from another perspective: as a Rusack Undergraduate Research Fellow studying the bridge’s storied past from a sociological and historical perspective.

The cribstone bridge, which connects Orr’s and Bailey islands, is reputed to be the only one of its kind in the world and is listed on the National Register of Historic Places. It is built solely of granite hunks piled into a “cribwork” formation, with spaces to allow the tides to pass through.

After spending so much time at, on, and even under the latticed bridge, Crawford says he fell in love with the beauty of the structure—its shape, its rustic simplicity, the unique design that has long inspired tourists, painters, and photographers.

As he began to uncover pieces of its controversial beginnings, however, he started to see it as a historical relic of a highly complex structure of social, economic, and political forces at play in this area of mid-coast Maine.

“The cribstone bridge changed the community after it was built,” he says. “Its construction was coincidental with the advent of the automobile, a decline in shipbuilding, and an increase in summer vacationers. The bridge was a boon for summer tourism.”

Crawford spent the early part of the summer doing archival research, poring over annual town reports, newspaper articles, and court records dating back to the 1880s. He then interviewed Harpswell residents about their own recollections of the bridge and the stories they had heard from their parents and grandparents.

“I’m most interested in how the idea of the bridge has evolved in the minds of Harpswell residents,” Crawford says. “In the 1880s, when the state Legislature originally approved the
project, the correspondence was all about money. In the 1920s, it was all about what it means to live in Harpswell. It is an interesting progression.”

At the heart of the controversy is the structure of the town of Harpswell. It is made up of many islands, the most populated of which are Harpswell Neck on the west side and Orr’s and Bailey islands to the east.

Residents of Harpswell Neck opposed the project because they didn’t want to help pay for a bridge that would benefit only the other side of town. Various iterations of the decades-long fight would make it all the way to the state Supreme Court at least three times before the issue was finally resolved.

In his research, Crawford found that residents had a deep sense of nostalgia for the past, but that their perceptions didn’t always coincide with historical reality.

“They remember Bailey Island as this place full of Mainers, but more than half the landowners were paying non-resident taxes when the bridge was built,” he notes.

“The main concern is that they love their bridge,” Crawford says. “It seems so unintentional. The engineer didn’t intend to design something that would make people fall in love with it . . . but it is a timeless object.”
an a tarantula be happy? Is an elephant proud? Do slugs dream? It's all in whom you ask, according to Psychology Chair Suzanne Lovett.

Lovett and student researcher Rachel VanderKruik '07 spent the summer conducting research with groups of children—from preschool through elementary school—to measure their understanding of animal psychology. Lovett also administered the study to twenty adult subjects, for comparison.

“We want to see if kids understand that the complexity of a creature's brain determines the complexity of its acts,” says Lovett. “Further, we’re wondering if their attribution of a mental life varies with their understanding of brains, spinal cords, nerves, and even the size of the animal. Ultimately, I’m trying to see if kids make a connection between our biology and our psychology.”

In one experiment, children were shown a series of cards depicting a wide range of animals. They were asked to sort them into a “do-have” or “don’t-have” pile in response to a slew of control questions. Do they see, smell, or hear? Do they remember, learn, think? Do they dream or make-believe?

“Kids have been saying very different things,” grins VanderKruik, who conducted some of these tests on children at the Bowdoin Children's Center and at other local camps and schools. “All age groups have confusions about whether the tulip is alive. A few have said that a worm can fight. The shark has brought out a lot of interesting responses: A few 7–8-year-old kids talked about echolocation and some even mentioned pheromones for smelling.”

And, yes, size does matter.

According to preliminary results, which Lovett is hoping to present at a meeting of the Society for Research in Child Development later this year, both child and adult participants attributed more psychological qualities to larger animals.

That isn't necessarily off base. Brain size, notes Lovett, corresponds roughly to body size. “But that doesn’t automatically correspond to intelligence,” she adds. “Elephants have large brains, but
they have large bodies, so much of their brain capacity is devoted to movement. Everyone said a human child is smartest, however, and we are not the largest animal.”

The perceived temperament of animals gave Lovett and VanderKruik some of their most surprising data. Most children—and many adults—attributed more psychological aspects to animals they considered to be dangerous, such as crocodiles and sharks.

“It would appear that some people attribute greater intelligence to animals that can attack us,” notes Lovett. “They might seem more clever and conniving than animals that don’t. That’s something that might be interesting to study further.”

Lovett’s work adds to a growing body of knowledge about folk psychology or “theory of mind.” This is our everyday, common sense understanding of human behavior. It allows us to explain and predict the behavior of ourselves or others.

“We’re all psychologists,” notes Lovett. “We’re all trying to understand somebody else’s behavior. It comes up in kids’ relationships with their parents: ‘Why are you doing this?’ What I am trying to study is what kids know at different ages. How do they figure the world out? How do they begin understanding themselves? This a piece of that puzzle.”

VanderKruik received a Surdna Foundation Undergraduate Research Fellowship in support of her summer research.
Marine Researcher Keeps Tabs on the Smallest

n the surface, it looks like a regular fishing trip. Gear up, haul the skiff down to shore. Row out, bait and cast your lines. Then wait for a nibble.

If you are Jon Allen, however, there is a catch to this story. Perhaps catch is a bad word. Allen, Bowdoin's Doherty Marine Biology Post-Doctoral Scholar, doesn’t actually want to catch anything at all. He just wants to know who’s nibbling.

Allen is a marine researcher at the Coastal Studies Center (CSC) who is studying predation on larval marine invertebrates such as sea urchins, crabs, mussels and lobsters. He conducted several experiments over the summer to try to determine who is eating these larvae and where they are most likely to be eaten.

“A bad day of fishing is a good day of work for us,” he jokes, threading small, translucent bait pellets onto hooks. “We are measuring our bait losses.”

During the course of one of these non-fishing trips, Allen and his summer research assistant, Eric Robinson ’07, measure how often their bait is nibbled—or eaten outright—at various locales. They can even examine bite marks or try to catch a predator in the act by using an underwater infrared camera that transmits video to a camcorder aboard the skiff.

“We sit on a boat, power the underwater camera, and watch what’s going on thirty feet down,” marvels Allen. “We look for predators like green crabs, rock crabs, lobsters, and even bigger predators, such as fish. We have a pretty good idea of where they’ll get eaten. What we hope to get is a more quantitative measure of who is eating them.”

Allen’s is the study of the underdog, those he calls the “small, defenseless creatures that are born into the big sea.” Of these, many marine invertebrates are released onto the benthos, or ocean floor, at birth. These bottom-born often have protections, such as egg capsules or chemical defenses. They’ll need it. The benthos is believed to be the deadliest part of the marine environment; it is where crustaceans and many other predators roam.
But there are other zones to the water column, and curiously little is understood about the unprotected larvae that are released, and struggle to survive, at varying depths between ocean surface and floor.

“Predators may be less abundant in the water column, but they are just as deadly,” notes Allen. “Not only do you have a wide array of fish, you have other creatures such as jellyfish, whose tentacles serve as drag nets.”

Thus far, their collected data confirm the treacherousness of the bottom. The next step is to determine which areas of the water column are safer than others, and if predation levels shift with factors such as tides, currents, and light.

Already, says Allen, they have determined that parts of the water column appear more dangerous than others.

“When you are roughly one meter off the bottom, predation is low,” he says. “As you continue up to the surface it gets high again. The peak is, of course, on the bottom, but you get a second peak at about three to six meters above the bottom.”

Ultimately Allen’s research will add important ecological information about the marine food web. And because some of the species he is studying are commercially important in Maine and elsewhere, there is keen interest in understanding the environmental threats and evolutionary strategies of these tiny life forms.
Making a Big Production About Mozart’s Operas

ozart’s operas have inspired productions from the lavish to the ludicrous since he premiered his first opera, Bastien und Bastienne, at the age of twelve in Vienna.

Mary Hunter, Bowdoin’s A. LeRoy Greason Professor of Music, spent the summer researching productions of his operas from the eighteenth through twenty-first centuries as part of her upcoming book A Companion to Mozart’s Operas, to be published by the Yale University Press.

The book will be written for interested lay people, possibly undergraduates or music lovers who attend the opera, but who are not opera scholars, she says. “I feel some responsibility to remember how to write in a way that makes the subject meaningful and interesting to people who are not musicologists,” says Hunter, who also is author of The Culture of Opera Buffa in Mozart’s Vienna (Princeton, 1999), which won the American Musicological Society’s Kinkeldey Prize.

Her new book will include basic information about all twenty Mozart operas, as well as a series of essays about questions of production, such as putting on an eighteenth-century opera in the twenty-first century.

There’s a famous Peter Sellars production of Don Giovanni set in Spanish Harlem, for example, and the banquet scene shows the hero tucking into a Big Mac and fries.

“I’m not so sure that works,” Hunter says. “But Sellars’ production of The Marriage of Figaro is set in Trump Towers, and I thought that was fabulous.”

Hunter is being aided in her research by Nick Kasprak ’08, whose job is to explore the visual representation of the opera productions. The research may just inspire an opera of his own.

“He is looking at the scenes, the costumes, the gestures, how people have imagined the whole thing,” Hunter says. “Basically, I sent him on a fishing expedition.”

Kasprak says he is viewing DVDs of various productions of the operas to explore how the directors approach different theatrical problems. His goal is two-fold: to contribute information
I feel some responsibility to remember how to write in a way that makes the subject meaningful and interesting to people who are not musicologists.

for Hunter's book, and to prepare for a two-year honors project for which he hopes to write and stage his own comic opera.

Kasprak, a physics and astronomy major, began taking piano lessons when he was five, and playing the French horn at nine. He has composed one symphony and one piano concerto, each a half hour in length. He acknowledges that composing an entire opera is much more ambitious, but he's giving himself a break: “It'll be in English, and it will be a comedy,” he says. “Comedy is much easier to do.”
At the heart of Chemistry Professor Beth Stemmler’s lab is a large, cylindrical instrument reminiscent of a commercial lobster steamer. It has, in fact, been used to trap various lobster peptides, but there the similarities end.

This is the Matrix Assisted Laser Desorption/Ionization Fourier Transform Mass Spectrometer, or MALDI/FTMS, for short. It is among the most advanced instruments for measuring molecular mass, distinguishing differences down to the mass, or weight, of a single electron. It can be used to trap and break up complex molecules to determine how atoms are connected and to elucidate molecular structure.

It was a true coup for undergraduate research at the College when Stemmler acquired the MALDI in 2001, with a major grant from the National Science Foundation. Bowdoin became the only undergraduate institution in the nation to own one.

Five years later, the MALDI is at the vortex of a growing body of groundbreaking cross-disciplinary research among Bowdoin scientists—and their students—in fields including chemistry, neuroscience, and environmental science.

On a day in August, for instance, six student researchers crisscross the lab, taking their turn on the MALDI as part of various research projects.

Chris Cashman ’07, a biochemistry major, is using mass spectrometry to help identify neuropeptides called orcokinin, which are present in a variety of crustaceans. An earlier research collaboration between Stemmler and Neuroscience Chair Patsy Dickinson turned up entirely new members of the orcokinin peptide family.

Using the mass spectrometer, Cashman is seeking out the newly discovered neuropeptide in a variety of crabs, lobsters, and shrimp. “So far,” he says, “we have found twelve new peptides within that family.”

Anna Conterato ’07, a biochemistry major, is working with both Stemmler and Dickinson on research that complements Cashman’s. Once he identifies the neuropeptides in the MALDI/FTMS, Conterato can analyze DNA from the same animals.
Students Advanced Lab Experience

“I just graduated as a chemistry major. I stayed because of the ambience of summer research. It’s a different type of research than what you do during class, which is very meticulous and systematic. The whole thing about summer research is that it’s actual research: You are doing graduate-level work as an undergraduate. So you have a lot of freedom because it’s all new ground. You have a goal—sometimes it’s a goal for the day, sometimes it’s the goal of summer—and you just kind of work your way through it. Sometimes it works, sometimes it doesn’t. If it doesn’t, you learn more what not to do, and that can be very valuable.”

—Lucas Amundson ’06

Conterato takes a moment to distill her summer research experience, landing, finally, on the richness of her interactions with her faculty mentors. “It’s great to work under two women scientists so respected in their fields,” she says. “It’s just a really casual atmosphere and they’re very supportive. It’s a wonderful opportunity. Plus, getting trained on the MALDI opens up a lot of doors.”

These patterns of collaboration—between professors, among students, across disciplines—are precisely what Bowdoin scientists had in mind in their proposal to fund the instrument. Increasingly, says Stemmler, these collaborations are becoming a part of the global scientific landscape.

“Right now is a time of intense collaboration between biologists and chemists doing mass spectrometry,” Stemmler notes. “Analyzing materials at a molecular level is critical for understanding how cells are functioning and how other biological processes are taking place. Mass spectrometry provides details about the structure of biomolecules that are not available using other instruments.

“Working on these biological questions has been a challenge for people doing mass spec and has resulted in the development of so many different ways to analyze and ionize these much more complicated molecules.”
In the age of Harry Potter and the celebrity author, it's hard to imagine books being created as unique works of art, in a single copy, with the artist unnamed. It certainly makes it more challenging to research the origin of such manuscripts, but Stephen Perkinson, assistant professor of art, spent the summer doing just that.

While on sabbatical in France last year, Perkinson learned of a fifteenth-century manuscript illuminator who has been largely ignored by historians because his style was considered "cartoony" compared to the jewel-like realism of his contemporaries.

"People were dismissive of him, but he's really a very good artist," Perkinson says. "He's deeply aware of all these artistic techniques. His style looks simple, but it's very sophisticated."

The artist is known only as "The Master of Wavrin," named for his principal patron, a mid-level French aristocrat who aspired to own a collection of illustrated works of fiction. Only ten manuscripts by The Master of Wavrin survive.

Perkinson is interested in examining the images in their historical context. All the texts, written a few years after the Turks took Constantinople, claim to be translations from Greek, Italian and Provençal. They also claim to be historical, says Perkinson, interweaving actual historical figures from the Crusades.

"I'm thinking about how the pictures illustrate the text, the implications of why he chose certain moments to illustrate, and what the audience would have thought about them," Perkinson says.

The Master of Wavrin worked for only seven years around 1455, precisely when the printing press was being invented. His books were not printed, but his art—created on paper instead of parchment, using less expensive materials—was much faster to produce than the standard illuminated manuscripts.
“Manuscript illuminators relied on a small clientele of very rich people,” Perkinson says. “They were trying to create a more stable market for what they did.”

Perkinson is developing his research into a paper to present at an art history conference in February 2007. He hopes to expand that into an article and, eventually, a book. “I want to examine how these pictures illustrate the texts, and how the manuscripts fit into the culture of printing,” he says. “What do they tell us about how people understood history?”

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It takes a particular kind of daring to un-write the life of a great poet and critic such as Samuel Taylor Coleridge. For English Professor David Collings, however, it is the only way to truly understand the man.

Collings spent the summer immersed in Coleridge’s life and works to begin piecing together what he terms an “antibiography” of one of the most brilliant—and confounding—figures of English literature.

“Instead of relying on familiar notions of what an author and biography are, I want to throw them up in the air and subject them to intense questioning,” says Collings. “I want to start over and ask what a person is, what an author is, what a poem is. When you ask these kinds of questions, all of the evidence changes in its significance.”

Coleridge has tantalized readers and critics alike for centuries. Known for his epic poems Rime of the Ancient Mariner and Kubla Khan, he is credited with launching the English Romantic movement with his sometimes collaborator William Wordsworth.

But he has borne the criticism of his peers—and history—for not completing works, a lifelong opium addiction, tortured personal relationships, and even charges of plagiarism.

Collings shifts the latter question to what he sees as a more accurate frame: “Coleridge says in his preface to Kubla Khan that it is a psychological curiosity, that he wrote it when dreaming on opium. What happens when an author says it’s not a poem, that his dream self wrote it? What does that do to our notion of authorship, of plagiarism?”

Normally, such literary and biographical research is the sole province of advanced scholars. Collings, however, has enlisted the aid of two Bowdoin undergrads—Tyler Davis ’07 and Peter “Mike” Igoe ’07. Both took his recent advanced literary seminar where they began intensive exploration of Coleridge. Armed with summer stipends, the pair deepened their research.

Their newness to the subject is a boon, says Collings, allowing him to look at Coleridge with fresh eyes.

“All of the work I’m doing arises from conversations I’ve had with them,” he says. “They give me wonderful provocation for further thinking and work.”

The students’ research is supported by the Martha Reed Coles Arts and Humanities Fellowship and the Surdna Foundation Undergraduate Research Fellowship Program.
All of the work I'm doing arises from conversations I've had with them. They give me wonderful provocation for further thinking and work.
when Professor of Chemistry Rick Broene shops for shampoo, he has all the advantages of his profession. He can scan the list of largely man-made ingredients and know exactly what he is using.

One chemical in particular often catches his attention: a derivative of a petroleum distillate called dodecyl sulfate.

It’s a product that shampoo manufacturers claim makes hair “silkier.” The same petroleum distillate puts the “cling” in Glad® Wrap. More importantly, says Broene, it has brought his research into a whole new area.

Broene, an organometallic chemist, has spent the past two years developing new catalysts that streamline the process of forming what are known chemically as alpha olefins—the precursors to hair silkens or clingier plastics.

The synthetic molecules are formed through a common process known as polymerization, in which large molecules are formed by combining smaller molecules in a regular pattern. In this case, two six-carbon molecules combine to give one twelve-carbon molecule. The olefin (a carbon-carbon double bond) is in the first, or alpha, position.

“Previously,” notes Broene, “scientists were able to put the olefin in the middle, or elsewhere, but no one had been able to make it favor the end of the chain. This created a lot of waste. What I did was to develop a catalyst—a metal supported by various organic molecules—that would speed up the reaction and also cause better selectivity for the alpha olefin. The result is a better yield of alpha olefins with less waste.”

While the commercial potential of his discovery might be promising, Broene is actually more interested in the catalytic ingredients than he is the actual product they help to create.

The catalyst he ultimately used was cobalt, a metal found on the right side of the periodic table (late-transition metals). Until recently, much of Broene’s research has centered on metals that are found on the left side of the periodic table.

“Late-transition metals tend to be less oxygen-reactive and less water-reactive, so my students might have an easier time working with them than with the early-transition metals,” says Broene,
who has involved more than forty undergraduate students in his work since coming to Bowdoin in 1993.

This summer, four Bowdoin student researchers worked in Broene’s lab—two students concentrated on improving the alpha olefin catalyst.

“Hopefully we’ll find something. Or maybe we’ll find something new. That is what science is about: being a careful enough observer to realize that if the reaction didn’t do what you wanted it to do, perhaps it did something more interesting.”
It's common enough to find plays adapted for film, but rarely does it go the other way around. How can one replicate the selective eye of the camera or compete with high-jinx special effects? These challenges were just the starting ground for Davis Robinson, associate professor of theater and dance, when he began creating *Samurai 7.0: Under Construction*, a highly imaginative new work by his Beau Jest Moving Theater Company in Boston.

The ensemble-driven work, which was performed in June 2006 at the Calderwood Pavilion at the Boston Center for the Arts, drew its inspiration from Akira Kurosawa's classic film, *The Seven Samurai*.

Kurosawa's film is a spare, beautiful study of character. A motley band of seven samurai is assembled to protect a poor village of farmers from bandits; when their mission is complete, they disband. No special effects—just gorgeous camera angles, fulsome character development, and what is widely considered to be one of the best battle scenes ever filmed.

"Like the samurai of the film, I loved this idea of pulling together an eclectic team of people in a common cause for no money, for rice," laughs Robinson. "It is very much like theater. We work for months with a common vision, for *communitas*, for nothing. And when the story is told, we are done. It is ephemeral."

Robinson spent much of his 2005-2006 sabbatical year developing the work, which gave him a chance to reconnect with members of his award-winning theater company, which he founded in 1984. The company of movement-theater artists has been hailed widely for original productions that often blend theatrical traditions, such as mime, shadow puppetry, standup and improvisation.

Since Robinson joined Bowdoin's faculty seven years ago, the troupe has been able to work together only sporadically.

"In the film, there are old timers and a couple of young people in this group of samurai," notes Robinson. "So I called up my core group of 'old timers' and also added three young actors I had
Like the samurai of the film, we work for months with a common vision, for *communitas*, for nothing. And when the story is told, we are done.

worked with at Bowdoin. We paralleled that theme of actors coming out of retirement to create a kind of show-within-a-show."

Robinson used physical innovation and fine stagecraft to interpret the visual elements of the samurai film. A circular shadow-screen downstage represented a village hut, but when lit, it became the backdrop for shadow puppets. Simple hand props—such as bamboo, grass, twigs—became a way of framing out the action, suggesting place, and even creating an illusion of distance.

“It is what is called ‘poor theater,’” says Robinson, “and to me that is the real joy of theater. If I hold my hand like this to represent a wall or a tree, I am asking the audience to imagine with me. That level of play is what I find most rewarding.”

The show is designed for touring, and Robinson hopes to bring it to Maine in the near future. “We like to share our works with as many different audiences as possible,” he says, “and touring allows us to keep fine-tuning the production.”
Scientists are concerned about introduced, non-native species that increasingly are finding their way to the Maine coast. A group of local middle-school teachers is excited to bring them into the classroom, however, thanks to a workshop sponsored by the Bowdoin College Coastal Studies Center (CSC) and the Maine Coastal Program.

Five pairs of middle-school teachers from around the state learned about invading species and coastal ecology during a week-long Coastal Science Institute for Middle School Science Educators this summer. The program, now in its second year, is designed to offer teams of Maine science teachers professional development, increase their “literacy” in marine and coastal science, and develop hands-on curriculum to bring environmental knowledge into the classroom.

This year’s institute focused on the invasive Green Crab and Asian Shore Crab, which arrived in Maine via the ballast water in large ships. The Asian Shore Crab is a more recent invader that has started to displace the Green Crab in southern New England and is suspected to have impacted shellfish populations.

With marine biologists Marney Pratt and David Guay as their instructors, participants explored the rocky intertidal zone on Bailey Island and at Biddeford Pool, where they learned field methods to catch and identify crabs and assess their distribution. Fieldwork was offset with lectures and laboratory work at the CSC marine lab on Orr’s Island.

“The goal of the institute is to help teachers develop a lifelong interest in coastal science and stewardship among middle-schoolers,” says Anne Henshaw, director of the Coastal Studies Center.
“Invasive species are a very relevant topic: They reduce biodiversity and degrade wildlife habitat with far reaching economic impacts.”

Throughout the week, the teachers discussed policy and economic issues surrounding invasive species, and presented ideas for developing multidisciplinary curricula to engage their students in and out of the classroom.

“We’re very encouraged by the level of commitment and creativity among these Maine teachers,” notes Henshaw. “They brainstormed, debated, and developed solid action plans for bringing this work into the classroom.”

Their ideas will become part of an Internet resource using Blackboard that will allow former, current, and future institute participants to share files and ideas electronically.

The Coastal Science Institute for Middle School Science Educators is funded by grants from Geoff Rusack ’78 and Alison Wrigley Rusack, the Libra Foundation, the Kenduskeag Foundation, and the Margaret E. Burnham Charitable Trust.
t could have been a movie plot. A Chinese scholar and her student hit the streets of Beijing in search of underground films. They have just a handful of names, no contacts.

After one lucky introduction to a film Web-page editor, Bowdoin Associate Professor Shuqin Cui and her student, Jordan Schiele ’07, learn of an independent documentary film screening at a small salon. There, they meet the film director, who introduces them to another.

Over the course of a month in China, Cui and Schiele increasingly find themselves drawn into a closed world—what the Chinese call *quan zi*, or circular network—peopled with independent documentary film directors, film critics, and a woefully small audience of mostly European film viewers.

This is what they came for: an immersion into the world of independent Chinese documentary filmmaking.

Far from the booming commercial images of modern-day Beijing, says Cui, these films often show the “mundane realities and the most disadvantaged social groups, such as floating populations, laid-off workers, homosexuals, HIV/AIDS victims, prostitutes, and others left behind by the new economy.

“Documentary films are an important component of official and commercial media in China,” she adds, “but independent documentary filmmaking is totally different. They are really underground. Often with a digital camera in hand, the director follows those underrepresented and keeps distance from the government. Independent and marginal, however, they have been largely isolated from potential audience and market distribution.”
Cui and Schiele want to change that—at least in their corner of the world. After a highly successful “treasure hunt,” they returned to Bowdoin in July with a collection of rarely seen documentaries that, according to Schiele, “present a fascinating contrast to what the Western media presents of China today.”

Schiele organized “On the Border,” a retrospective of six of these films, which were shown on campus this fall. It was co-sponsored by the Film Studies and Asian Studies departments.

“I developed this project in order to provide fellow Bowdoin students and Brunswick residents with a more holistic and less mainstream perspective on modern Chinese issues,” notes Schiele, an Asian studies/government major who has studied, traveled and worked in China four times in the past two years.
re men neurologically patterned to view other men as threats? Do women naturally “tend and befriend” other women?

These social stereotypes may actually have physiological origins, according to a study published by Associate Professor of Psychology and Neuroscience Richmond Thompson.

The study, which appeared in the May 2006 journal *Proceedings of the National Academy of Sciences*, is the outcome of nearly a decade of research by Thompson and colleagues on the hormone vasopressin—a peptide long known for its role in the regulation of physiological processes, such as water retention and blood pressure.

In recent years, researchers have discovered that vasopressin also acts within the brain to regulate various social behaviors, such as aggression, courtship, and pair bonding among research animals.

This summer, Thompson and his colleagues began investigating vasopressin’s social effects on humans—with some intriguing preliminary results.

Groups of men and women were given nasally administered doses of vasopressin, or a control substance, saline. As expected, vasopressin generally increased anxiety. Unexpectedly, however, men and women showed different social responses when asked to perform a research task.

When exposed to pictures of happy models, “men given vasopressin showed a suite of aggressive tendencies typical of ‘fight or flight’ responses,” notes Thompson. “That included facial responses as well as decreased ratings of how friendly they thought other men were.

“Women given vasopressin, on the other hand, showed responses consistent with more collegial behavior. They rated the women in their pictures as being more friendly and approachable than did women given the control, and they exhibited facial muscle activities such as smiling."

Thompson is cautious about drawing broad conclusions, but says these early, sex-specific findings suggest that “men and women have evolved alternative social strategies in conditions of stress. A wealth of data already suggested that vasopressin played an important role in the regulation of social strategies during vertebrate evolution, but there has been little causal evidence that this was true in humans.”
Future research may include studies examining the breakdown of vasopressin, which some researchers suspect is linked to symptoms of autism.

Thompson was assisted in his study by Scott Orr of Harvard Medical School and Dr. Jeff Benson of Bowdoin College. Bowdoin student Meaghan Kennedy ’06 also helped him with the research.

“The neurochemistry of social behavior is a vast area of exploration,” says Thompson. “Our study is just a piece in the ongoing puzzle to understand what makes human beings tick.”
Stephen Majercik has a problem. A big problem. It is so difficult, in fact, it belongs to an actual class of complexity. In computer science speak it is what's known as PSPACE-complete. That translates, roughly, as "impossible," laughs Majercik, assistant professor of computer science.

Problems are the stuff of computer programming, and like most problems that ultimately relate to artificial intelligence, Majercik's computation is an attempt to mathematically codify certain aspects of human behavior and reasoning.

In this case, Majercik—and student research assistant Mark McGranaghan '09—are working on a probabilistic planning problem. They are trying to come up with a program that could help robots make planning decisions in an environment in which there are uncertainties.

"A robot has limited sensors; it never has a complete picture of its world," notes Majercik.

"And, being a mechanical agent in the real world, a robot also has limited accuracy in its actions. We're trying to come up with a plan that would allow the agent, given its knowledge of what the possible outcomes of its action are, to come up with a universal plan for every possible contingency in its environment.

"You want to know, if this happens I should do this, if that happens, I should do something else. You want to plan for all the possible contingencies. The answer is a tree—you take an action, then there is a set of possible actions depending on what is sensed after you take that action, then another set of observations and actions for each of those actions, and so on. The size of the tree can grow very quickly."

The exponentially increasing time required to solve such a problem becomes unreasonable quickly, as can the amount of computer-memory space needed to store the solution tree. Therefore, Majercik and McGranaghan are looking at a subset of these problems to try to find an efficient algorithm for at least a useful subclass of these problems.

"I'm devising various algorithms and testing them on different problems," says McGranaghan. "I started with a classic tree-based approach; it's simple but it tends to take unmanageably long to run. So we decided to look at variations on that algorithm and to apply
them to different versions of the problem. For example, we tried an algorithm that saves time by trying to approximate the answer instead of finding it exactly. We had modest success with that.”

Majercik is philosophical about the daunting nature of the challenge. It is, he says, emblematic of research in artificial intelligence.

“The problems people look at in artificial intelligence are ridiculously hard, but we try to find ways to solve them,” notes Majercik. “The tantalizing thing is, we know that, in many cases, they are solvable because they are things that people do without a second thought. Now we have computers that can play chess at the same level as a chess grandmaster, but things that a child can do—walk into a room and recognize things and understand what’s going on—getting a robot to do that . . . well, let’s just say, we’re working on it.”
he played one of the most iconic characters in film history: the faded, and possibly insane, former silent movie star Norma Desmond in Billy Wilder’s classic 1950 film *Sunset Boulevard*. She famously uttered lines of dialogue that have become entrenched in the American pop culture lexicon, such as, “All right, Mr. DeMille, I’m ready for my close-up.”

Yet, oddly, little has been written about film legend Gloria Swanson (1897–1983) beyond her own 1980 memoir *Swanson on Swanson*.

Associate Professor of Film Studies Tricia Welsch plans to give this legend the true close-up she deserves. She is working on a new, nuanced biography that will “put her life into historical context,” she says.

Welsch, whose research interests include the film industry and German silent film, chose Swanson as a subject because she wanted to research someone who had made the transition from silent to sound films. She looked for an artist for whom good archival documentation still survived.

As it turns out, the Harry Ransom Humanities Research Center at the University of Texas at Austin has 624 boxes of Swanson’s papers, including personal correspondence, love letters, telegrams, business records, and appointment books. Welsch has spent several months there during the past few years poring over the material.

This summer, her research took her to France to interview Michelle Farmer Amon, Swanson’s only surviving child. “She was very willing to share memories of her mother and the people who came in and out of Gloria’s life,” says Welsch.

Swanson started acting in silent films as a teenager. At the height of her career, she was one of Hollywood’s most active and highly paid actresses, churning out five films a year draped in ermine capes and peacock-feather headdresses.

In the mid-1920s, Swanson tried to break from the “clotheshorse” mold that she and Paramount Studios had created: She joined Charlie Chaplin, Mary Pickford, Douglas Fairbanks, and the director D.W. Griffith as a member of United Artists, then an upstart independent film company. Her association in the venture was short-lived, and she never really succeeded in shaking the glamorous stereotype.

That image worked against her in the 1930s and 1940s, when the Great Depression distanced her from an audience that had become less interested in glamour.
But, says Welsch, “she was creative in the way she lived her life, in the way she kept trying to remake her life. Leaving Paramount was a very unusual thing to do, and finding work afterwards was much more difficult than she thought it would be. She had to learn about business. But learning was attractive to her, and she made it a life practice. She never looked back.”

Swanson responded to her waning public star by becoming an entrepreneur. She founded her own very successful hosiery and cosmetics companies, and launched a dress line, later winning the prestigious Neiman Marcus Award for Distinguished Service in the Field of Fashion. During World War II, she helped four Eastern European Jewish inventors form a company called Multiprises, which developed a metal ore used for tanks. In 1948, she debuted her own variety show on television, then a fledgling medium, the week after WPIX went on the air in New York.

She was called back to Hollywood in 1950 to star in *Sunset Boulevard*. Despite receiving her third Academy Award nomination for her unforgettable portrayal of Norma Desmond, she appeared in films only sporadically after that.

But she didn’t slow down. In the 1950s, long before it was trendy, she became a self-described “health nut” and advocated natural foods and yoga. She was instrumental in lobbying Congress to pass the first bill limiting pesticides in foods.

“The time during her life when she was not a big star is fascinating,” says Welsch. “She had to work for a living. She said her epitaph should say, ‘She paid the bills.’”

**Gloria Swanson was self-educated.**

She called herself a “mental vampire” because she tried to suck as much knowledge as she could from the people she met.