SUMMER 2012

LASNews

College of Liberal Arts and Sciences
University of Illinois at Urbana-Champaign

A RACE TO THE BOTTOM

Illinois at the Crossroads

A Hands-On Future for Learning

What Did Steve Do?

Voices from the Gender Divide

Temple of the Gods and of the Tourists

LASNews SUMMER 2012

College of Liberal Arts & Sciences AT ILLINOIS

SUMMER 2012

facebook.com/las.illinois
facebook.com/lincolnhall.illinois
twitter.com/LASillinois

"We shape our buildings; thereafter they shape us."

— Winston Churchill

It's been four years since classes have been held in Lincoln Hall. Yet, this summer the college is moving back to its home of nearly 100 years. What a homecoming it will be!

Nearly every inch of the building has received a facelift, including the basement. This area, once catacombed with storage spaces and graduate student offices, was fully excavated—with the building suspended on piers for several months—to make room for the new mechanical systems. These piers remain, making the original foundation stronger than ever. On the other floors, all the rooms, with the exception of the historic areas, were completely dismantled, then reassembled, retaining the best of the old. For instance, the original oak classroom doors on the first floor were restored along with the old-growth oak trim, which now frames the windows on every floor. All of the exterior work meets the standards required for registry as a National Historic Building.

The interior historic areas received similar, painstaking care. The color scheme is original, down to the gold-leaf paint encircling the foyer. In the theater, a team of painters and plasterers devoted three months to meticulously restoring the ornamentation by hand. Even the Lincoln bust received a makeover. When the bust returns to its place of prominence in the building's foyer this August, it will look as splendid as it did when it arrived at U of I in 1928.

The original architects believed that physical spaces can be transformative: Grand spaces inspire grand dreams. Thus, the marble entryway and soaring spaces of Lincoln Hall were intended to remind all who entered that they were part of an important undertaking. It was a signal to leave the ordinary beyond and strive for the extraordinary.

As we unpack our boxes and power-up our computers, we are aware of the legacy and the promise of Lincoln Hall. From day one, the intent of the renovation was to respect the past but be cognizant that Lincoln Hall has a job to do. Learning happens here—for thousands of students every year from all backgrounds. Lincoln Hall is once again a state-of-the-art learning environment. The college will be emphasizing innovation in every aspect of its undergraduate curricula because that is what is needed for U of I to continue to be a place of opportunity. These beautiful surroundings amplify the dignity of that mission and provide a constant reminder that our work has never been more important.

Ruth V. Watkins

Ruth Watkins, Harry E. Preble Dean
College of Liberal Arts and Sciences

LAS News SUMMER 2012

Editor
Holly Korab

Copy Editor
Holly Rushakoff

Art Director
John Bonadies

Contributing Writers
Dave Evensen
Holly Korab
Doug Peterson

LAS News is published twice annually for alumni and friends of the College of Liberal Arts and Sciences, University of Illinois at Urbana-Champaign, Office of Advancement, 2111 S. Oak St., Suite 100, Champaign, Illinois 61820, (217) 333-7108. The college also publishes a monthly electronic newsletter, *LAS News Online*. Please direct all inquiries about either publication to the editor at laseditor@illinois.edu or at the above address.

las.illinois.edu

Pocket Home Sensor Could Test for Viruses, Bacteria, Even Cancer

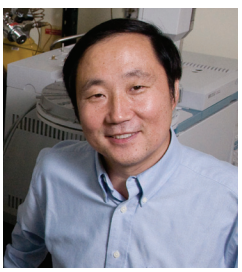


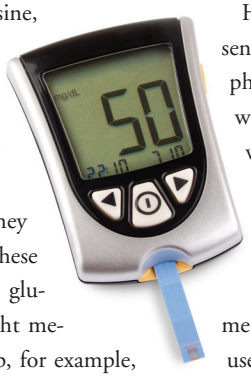
Photo by L. Brian Stauffer

In the not-too-distant future, people might be able to walk into their local pharmacy, pluck a box off the shelf, and after a 10-minute test determine whether it's possible that they have cancer.

LAS researcher Yi Lu has laid the groundwork for such a remarkable scenario by adapting the common glucose meter to test for all kinds of substances, from lead in water and pesticides on our vegetables to bacteria and viruses in our blood. It could even someday detect cancer or HIV.

"When I went to Walgreens or other similar stores, I constantly saw glucose monitors on the shelf, readily available. So it occurred to me: What can we do to utilize them?" says Lu, a University of Illinois professor of chemistry.

Lu and postdoctoral researcher Yu Xiang found that they could modify glucose meters to successfully test for minute traces of four substances: cocaine, uranium, adenosine, and a disease marker for tuberculosis. They intentionally chose four dramatically different targets to determine the versatility of their system.



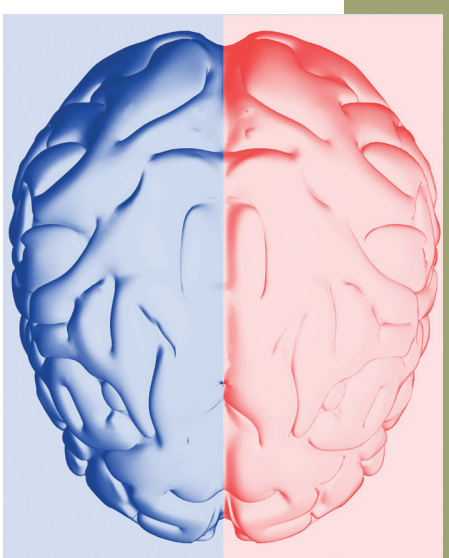
The system works because they found a way to link the level of these target substances with the rise in glucose levels shown on a store-bought meter. When levels of uranium go up, for example, so do glucose levels, and this is measured by the standard glucose meter.

What Lu envisions is that various kits will be available on the shelf containing strips that could be inserted into an existing glucose monitor in place of the typical strips used by diabetes patients. One kit would contain strips to measure bacteria levels, another kit would contain strips to measure toxins in water, and so on.

However, he cautions that a home-testing sensor may not always replace the more sophisticated lab tests done by hospitals. It would mostly act as a way to screen for various conditions, and a positive reading above the threshold level would alert people that they need to see a doctor for further, in-depth testing.

Lu is developing a company to commercialize the new system, and by making use of glucose meters they can tap into an existing $10 billion market.

"I'm optimistic about this sensor since the market for glucose meters already exists," he says. "I think it could be available within five years."



FORGETTING BAD MEMORIES

Sometimes we prefer to forget. But how do we put negative memories behind us when they're always there in our rear-view mirror?

For men and women, what works seems quite similar, but what backfires can be dramatically different, according to a new study from U of I. Also, basic personality differences play a big part, says Florin Dolcos, the psychology professor who conducted the study with two postdoctoral researchers.

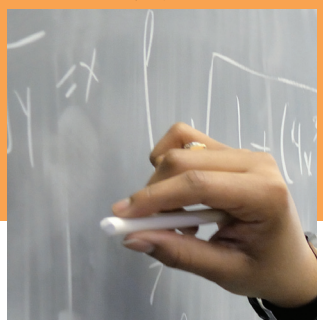
Reappraising memories—that is, making an effort to think differently about the memories—helped both men and women, though in slightly different ways. The men recalled more positive memories and women had more positive emotions.

Not so with "suppression"—a coping mechanism in which people try to blunt or hide negative emotions. For men, suppression had no effect on their ability to recall positive or negative memories. But for women, suppression made matters worse. Women who habitually suppress bad memories are much more likely to recall them and be adversely affected by them.

As might be expected, men and women who were extroverted—gregarious and assertive—tended to remember a greater proportion of positive life events than did introverts. Furthermore, men and women who dwelled on negative emotions, especially in times of stress, perceived life as sadder. Such men tended to recall a greater proportion of negative memories and the women tended to return to the same negative memories again and again.

"Depressed people recollect those negative memories and feel sad," Dolcos says. "As a result of feeling sad, the tendency is to have more negative memories. It's a vicious circle."

Photos by Thompson-McClellan



A HANDS-ON FUTURE FOR LEARNING

Courses in science, technology, and math evolve for a challenging world.

By Dave Evensen

On a typical weekday, the Unit Operations laboratory in Roger Adams Lab is as it should be: A bustling, noisy, sometimes argumentative place where teams of senior chemical engineering students perfect techniques that will be crucial in a few short months at their first job.

This is where they learn the nuts and bolts of industry—the ways by which companies make everything from Cheetos to hand sanitizer to blended gasoline. One afternoon, Kevin Homann stands before a clear distillation tower constructed as a series of tubes and bubble-like compartments that reach the ceiling. His team is distilling ethanol from water.

"I'm actually going to be working with ethanol when I graduate," he says, as vapors rise and condense throughout the tower. "I have a job lined up, and we'll do the same process. So for me this is great because I'm learning stuff that I will use in my job."

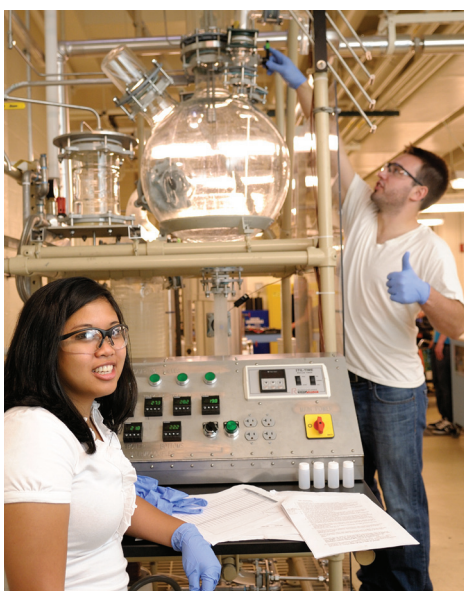
As industries rapidly evolve, statements like Homann's are shining indicators of success for faculty and staff across campus. The University of Illinois is well-positioned to lead in what's becoming a nationwide emphasis on science, technology, engineering, and mathematics, but doing so requires focusing on student needs—one classroom, research lab, and spectrophotometer at a time.

"Creating learning environments that foster expertise and leadership in these areas are a top priority," says Ruth Watkins, dean of the College of Liberal Arts and Sciences. "And providing these environments requires resources—not just financial investment but creativity, foresight, and detailed planning."

LEARN BY DOING

They call calculus the language of science. Indeed, in the Department of Mathematics they're discovering that one of the best ways for students to learn these fundamental concepts is to talk as much as possible.

In itself, collaborative calculus isn't a novel concept. Whereas your father might have learned calculus by the old-school method—students sitting quietly in rows for class, speaking when called upon—educators since roughly the 1990s have come to grasp the importance of student idea-sharing in learning mathematical concepts.



Students in Roger Adams Lab run experiments using a distillation tower. Hands-on laboratory experience is vital to chemical engineering students as some 70 percent of graduates enter industry directly after college.

What's new at the Department of Mathematics, however, is how they've managed to improve discussion in large, high-demand courses where conversation can be unwieldy. Scott Ahlgren, associate chair of mathematics, says that while students at Illinois are exposed to some of the best professors in the field during lectures, separate discussion sections are where the subject has a chance to sink in.

Thus, by reformatting these small-group sections, the department is meeting demand and increasing performance. In "Calculus II," for example, a required course for science and engineering majors with some 1,200 students this spring, discussion sections have students working in small groups to complete carefully crafted worksheets. The teaching assistant circulates the room answering questions, and she bases each group's grade on one randomly selected team member's answers, ensuring that students work together to learn the concept.

Earlier, smaller initiatives helped the department to identify the most effective format for these discussion sections and their ideal size (28 students)—one that balances instructional costs with the opportunity for feedback.

Katie Anders, a doctoral student in mathematics and a teaching assistant for "Calculus II," says that this style of teaching is much more rigorous than conducting a lecture—on some days she might be crisscrossing the room all period answering questions—but as a teacher she feels she better understands students' grasp of the topic.

"I feel like the students are a lot more engaged," she says.

"WE HAVE BEEN ABLE TO BUILD EXCELLENT, RICH LAB EXPERIENCES FOR OUR STUDENTS, WHICH HELP THEM GET JOBS EVEN WITH BACHELOR'S DEGREES AT PLACES LIKE LILLY, MONSANTO, KIMBERLY CLARK, PFIZER, AND ABBOTT."

An instructor reviews solutions to problems with students in "Calculus II." The Department of Mathematics has developed a model for running effective discussion sections even in high-demand courses with large enrollments.

PRIORITIZING UNDERGRADUATE RESEARCH

Of all the lessons Michel Bellini stresses to his students, perhaps the most important is this: Molecular and cellular biology is an experimental science.

That's why there's a sense of both urgency and excitement these days as the School of Molecular and Cellular Biology (MCB) sees an unprecedented rise in enrollments and interest. Cutting-edge labs are more important than ever.

"We really need to be able to show students the right experiments, the right way," Bellini says.

In practical terms, that means centralizing laboratories, and purchasing digital fluorescent microscopes, spectrophotometers, integrated teaching systems, and other equipment to ensure a hands-on experience for students.

Recent purchases, for example, include polymerase chain reaction devices, used in forensics labs to amplify small amounts of DNA into larger amounts that can be analyzed—a realistic version of the tools used to trace blood samples in *CSI: Miami*.

Melissa Michael, assistant director of undergraduate instruction, notes that other large public universities have been scaling back lab hours and even doing away with lab courses for non-majors. Not so at Illinois. Students begin lab courses early, and some 25 percent of students in MCB's core lab courses are non-majors.

"We have been able to build excellent, rich lab experiences for our students, which help them get jobs even with bachelor's degrees at places like Lilly, Monsanto, Kimberly Clark, Pfizer, and Abbott," she says.

CREATING MARKETABLE SKILLS

Back in the Unit Operations laboratory, as if it's not busy enough, chemical engineering faculty arrive to lead tours for prospective students.

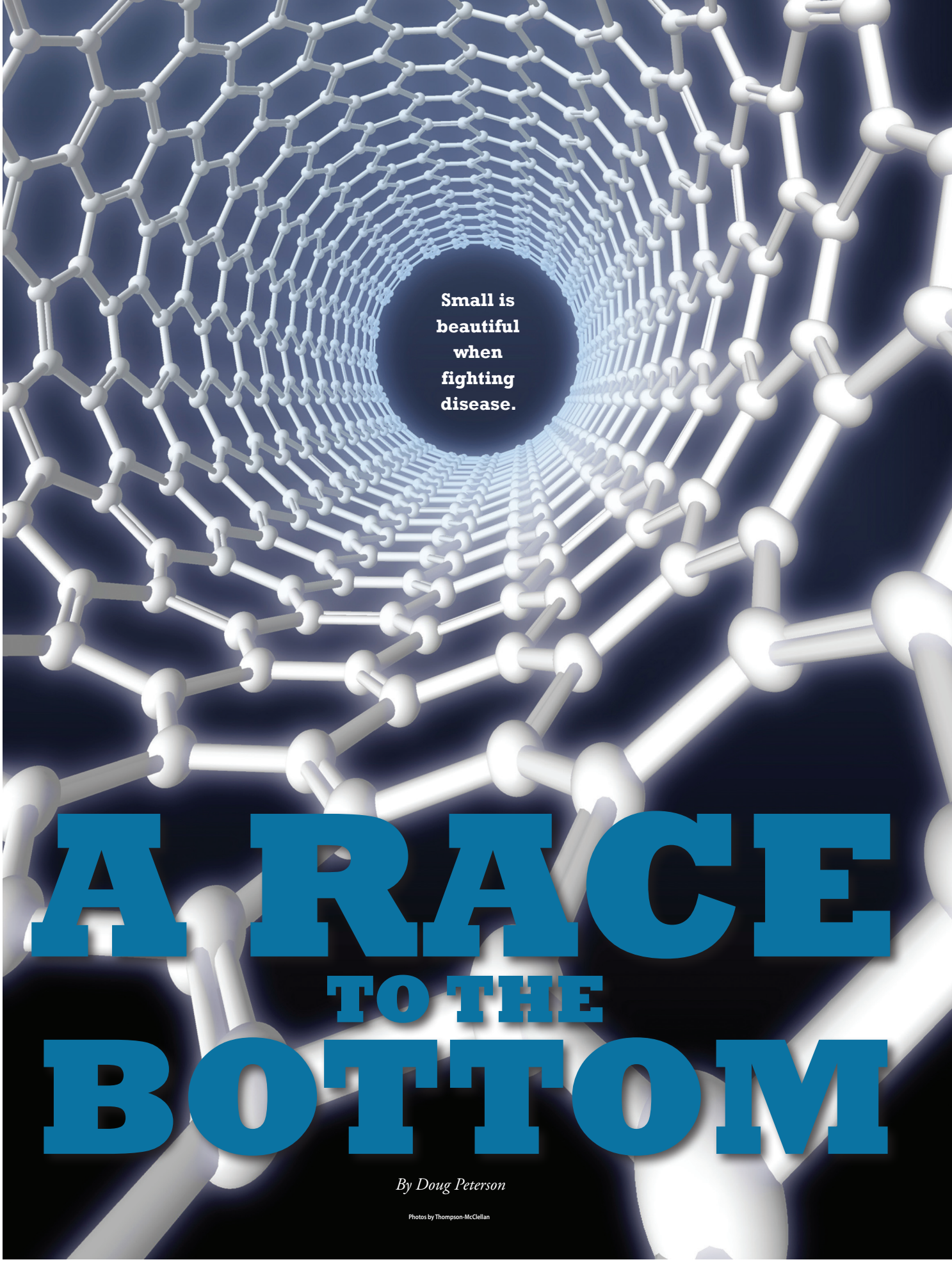
Increasingly, roundtable discussion, in addition to larger lectures, is seen as integral to helping college-level students learn, professors say.

This place is that important; in industry there are similarities in managing chemical processes whether you're refining gasoline or making vats of spaghetti sauce. Students learn it climbing ladders and checking pressure gauges in Unit Operations.

Job skills are vital here. Some 70 percent of chemical engineering graduates go directly into industry after graduation, with most of the rest entering graduate or professional school, the Peace Corps, or the like. So, through disciplined planning on maintenance, timely renovations, and the use of external and internal grants, the Department of Chemical and Biomolecular Engineering has forged the future of the laboratory.

"All courses are in some sense important, but a course like this is especially important," Professor Edmund Seebauer says. "Students take physics labs and chemistry labs earlier. But for a laboratory experience in chemical engineering this is the only one that they've got."

Recent improvements came at just the right time, too—just like the Unit Operations lab itself, the future of chemical engineering at Illinois is a busy one. Enrollments in the department are at their highest in 30 years. ■



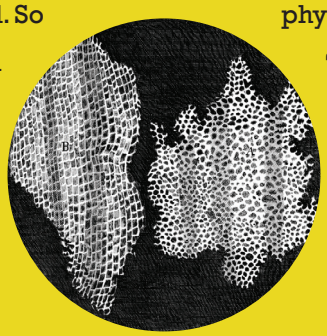
Small is beautiful when fighting disease.

A RACE TO THE BOTTOM

By Doug Peterson

Photos by Thompson-McClellan

When the 17th-century scientist Robert Hooke first peered through his microscope at a thin slice of cork, he saw microscopic "boxes," which to him resembled the rooms, or cells, where monks prayed. So he dubbed these structures "cells"—a word that has carried down to us.



Today, scientists can gaze far beyond the cells that Hooke studied and sketched; they can peer down to the mysterious, ultra-small world of the nano. Scientists are even discovering how to manipulate the basic building blocks of matter, creating nano machines so tiny that they can actually enter into the cells that Hooke was amazed to see.

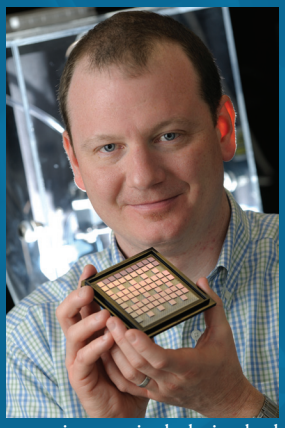
Nanotechnology deals with molecular machines less than 100 nanometers in size—roughly 100 to 10,000 times smaller than human cells. It has all types of applications, but some of the most intriguing nano projects target human health, as sensors the size of biological molecules may someday roam through blood samples scouting for cancer cells.

The birth of nanotechnology is often traced back to physicist Richard Feynman's landmark 1959 talk, "There's Plenty of Room at the Bottom." Today, nano researchers at Illinois and around the world are all headed in the same direction—to "the bottom," the smallest of the small.

The following stories provide a peek at the kind of nanotechnology work that three LAS researchers are doing on serious health issues, ranging from brain tumors and prostate cancer to pharmaceutical breakthroughs. Their work is distinct, but it shares a common goal: They are all getting to the bottom of things—both literally and figuratively. They're working at the smallest level of matter, and they're also getting to the bottom of the mysteries behind some of the most persistent and dangerous diseases we face today.

NANO IN THE OPERATING ROOM

Nano-scale tool can improve diagnosis of cancer and other diseases.



The patient is on the operating table, and the surgeon has done a craniotomy, creating an opening into the skull to remove a tumor. It's a delicate procedure to say the least, but the doctor is searching for more than just tumor cells. The surgeon is also seeking information.

"You want to get information about the type and size of tumor, as well as the potential for treatment; and you want to get this information all at once because you don't want the patient to go in for multiple surgeries, particularly in the brain," says Ryan Bailey, University of Illinois professor of chemistry.

That is why Bailey's lab has developed a sensor that could give surgeons a way to collect significant amounts of information while a patient is under the knife. In fact, the groundwork is being laid to move their nano-scale sensor from the laboratory to the operating room, where it will be tested out in diagnosing one of the most frightening of tumors—brain tumors.

Bailey's team is working with the Harvard Medical School, preparing the sensor to be tested in their operating room within a few years. During surgery, Harvard neurosurgeon Mark Johnson will remove a piece of a brain tumor, and then a technician will use Bailey's sensor to extract and rapidly analyze "microRNAs"—very small RNAs that play a key role in gene regulation. Within 15 to 30 minutes, this process will provide information on the sub-type of brain tumor, giving doctors a better idea of how aggressive they should be surgically.

"Some tumors can be treated effectively with chemotherapy or radiation, but other types are not responsive at all," Bailey says. "If the sensor tells you it's a non-responsive type of tumor, then you want to be more aggressive surgically."

The beauty of U of I's nano-scale "waveguide" is that it can potentially be used with many forms of cancer, as well as other diseases ranging from Alzheimer's to arthritis. For instance, Bailey's lab is working to develop a biomarker panel that can identify Alzheimer's disease in patients before any clinical signs are evident.

The sensor technology is being commercialized by Genalyte Inc., a San Diego-based company. He anticipates that in about a year they will have

"Our system will soon have the capability to measure over 100 biomarkers from a single small sample. That's because our sensor chip has many different racetracks, and each one can be made to selectively detect a different biomarker."

available their first diagnostic panels to detect disease-specific proteins in the blood, whereas the cancer platform to be used at Harvard will likely take a few years.

The waveguide system developed in Bailey's lab is based on nano-sized racetracks that confine light. Light speeds round and round the circular track, which is made out of silicon strips only 500 nanometers wide and 200 nanometers tall. When certain biomarkers attach to the racetrack, they change how long it takes for light to complete a lap, and this change can tell technicians a lot about the disease being diagnosed.

Getting information about brain tumors without major surgery is challenging, Bailey says, because the brain is difficult to biopsy; you typically can get only small amounts of tissue compared to tumors in other parts of the body, such as the colon. Their sensor solves this problem because it can extract a lot of information from a very small tumor sample by measuring *multiple* biomarkers all at once.

"Most conventional diagnostic systems measure the presence, absence, or amount of only one biomolecular marker at a time," he says. "Currently, if you want to measure multiple biomarkers, you need multiple samples—or one large sample that you divide.

"Our system," he says, "will soon have the capability to measure over 100 biomarkers from a single small sample. That's because our sensor chip has many different racetracks, and each one can be made to selectively detect a different biomarker. When a sample is flowed over the sensor array, we measure each of the different biomarkers simultaneously, giving us a lot of information from one sample."

What's more, the U of I sensor has already been used to detect markers for liver, pancreatic, colorectal, ovarian, breast, and prostate cancer. Illinois researchers are now targeting new sets of markers selected by their Harvard colleagues.

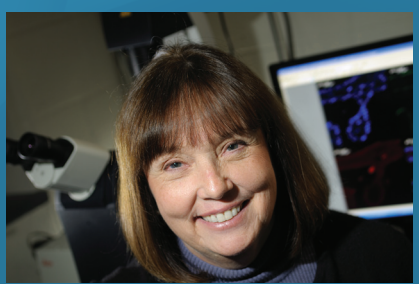
"Molecular measurement is the future of medical diagnoses," Bailey says. "We need techniques that can gather lots of information from small amounts of samples and can do it on a cost-effective platform that is highly scalable. That's the future. That's where everyone is going, and it's a race to get there." □

HOW SMALL IS SMALL?

Nanotechnology deals with objects less than 100 nanometers—similar in size to large biological molecules, or 10,000 times smaller than human cells. Any nanoscale device smaller than 50 nanometers can enter most cells. Hemoglobin, which carries oxygen in red blood cells, is about 5 nanometers in size, while DNA is about 2 nanometers. To paint a picture of just how small this is, scientists and writers rely on a host of visual comparisons. For instance, Britain's Wellcome Trust offers up these striking images: If a 20-nanometer object were blown up to the size of a soccer ball…

SECURITY CHECKPOINTS IN THE BLOOD

Illinois researchers search for a better way to screen for prostate cancer.



Most people are familiar with winding security lines at busy airports, as frazzled travelers empty their pockets and shuffle through screeners. The same thing may someday be happening at the nano-scale level, as DNA moves through an incredibly small screening device developed by University of Illinois researchers. But instead of looking for terrorist threats in the air, this screening device will be looking for biological terrorists in our blood.

More specifically, it will be looking for biomarkers for prostate cancer.

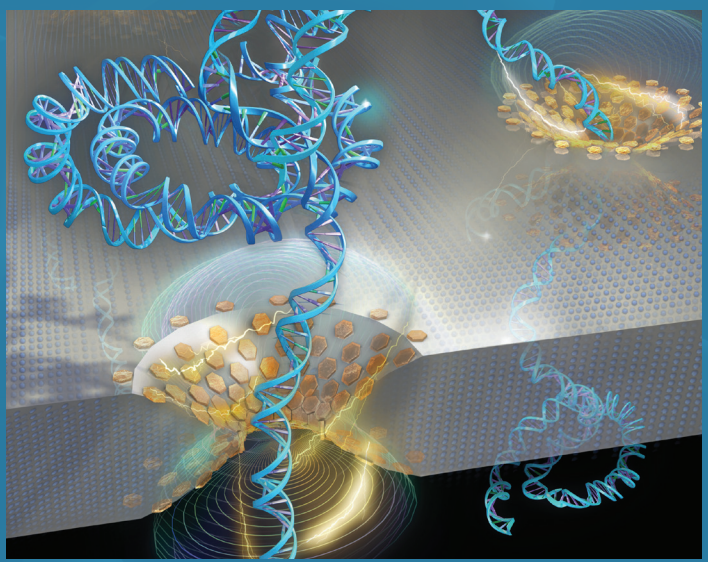
Traditionally, men have been screened for prostate cancer with the long-standing prostate-specific antigen (PSA) test—not to be confused with the TSA, which screens people at airports. But the PSA, like the TSA, has become controversial in recent years.

"The PSA test is under the gun.... There's a need for better cancer markers for prostate cancer."

"The PSA test is under the gun," says Ann Nardulli, an LAS professor of molecular and integrative physiology. Some health care experts say that the test is not a good prognostic marker because high PSA levels can be caused by reasons other than prostate cancer. As a result, the test unnecessarily sends men to surgery; and surgery poses risks of its own, such as impotence and incontinence.

"There's a need for better cancer markers for prostate cancer," Nardulli says, so her lab has teamed up with U of I engineer Rashid Bashir and two investigators at the Mayo Clinic to devise a more accurate screening tool using nanotechnology. She is working on a way to tag methylated DNA. DNA methylation plays a key role in regulating the expression of genes, but it is believed that certain genes are more methylated in prostate cancer patients.

With this in mind, Nardulli's lab has found a way to express and purify a protein that binds to methylated DNA. They supplied Bashir's lab with this protein, and the engineers are taking it from there, creating a nano-scale device that can detect methylated DNA tagged with this protein.



FROM BOMB-SNIFFING ROBOTS TO AIRPLANE ARTERIES

In the odd world of nanotechnology, inanimate objects bruise, bleed, and even sniff the air.

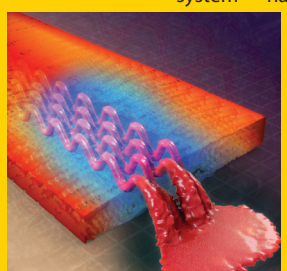
Nanotechnology works at minute dimensions thousands of times smaller than a human cell, making it possible for researchers to create tiny devices capable of scanning for disease in the bloodstream or delivering targeted treatments. But nanotechnology also has a myriad of uses in *nonliving* matter, where it is very good at mimicking the body.

For instance, cars have exhaust systems, navigation systems, and fuel systems. But in the future, they might also have circulatory systems, comparable to vascular systems that carry blood throughout the bodies of humans and animals, says Jeffrey Moore, an LAS chemistry professor.

Moore and his engineering colleagues, Scott White and Nancy Sottos, have come up with a method that could be used to create a network of nano-sized channels throughout the bodies of airplanes, automobiles, or ships. If a cut develops in an airplane wing, this circulatory system would send healing agents to repair the damage.

Illinois researchers recently took a major step toward such a system when they became the first to demonstrate a feasible way of creating a vascular network in fabricated material. During fabrication, they placed extremely small "sacrificial fibers" inside the material. When temperatures reached a certain point, the fibers were destroyed, leaving behind a network of tiny, empty channels. The idea is to fill the network of hollow channels with healing agents. Then, when a component is damaged, the channels rupture and the healing agents are released and mix, triggering the healing process.

According to Moore, technicians will be able to regularly add fresh healing agents to nano channels, much the way you change the oil in your car. What's more, hollow channels can be filled with many different types of materials—not just healing agents. For instance, a vascular system within an airplane wing could contain de-icing agents.



Nano devices take all shapes and forms, with exotic names like nanopores, nanowires, quantum dots, nanotubes, and nanoshells. Moore is also working with *nanofibers* that can detect small amounts of vapor released by TNT and other explosives. A company that produces systems for detecting land mines has already picked up on this research and is attempting to commercialize a system that can more effectively detect land mine vapors rising up through the ground.

Today, bomb-sniffing dogs detect explosive vapors at the level of parts per billion or parts per trillion. The idea is to replace these dogs with robots equipped with nanofiber sensors that travel across dangerous territory, sniffing out bombs.

"A dog sniffs the air above the land mine," he says. "But dogs are living animals and can get distracted. A robot cannot be distracted."

Moore has even created "the ultimate nano system"—nano-sized entities that undergo a force-induced chemical change deep within a mechanical part when it is damaged. If a key component in an airplane is damaged and weakened internally, this chemical reaction will actually cause the part to change color, much the way that a bruise changes the color of our skin, revealing internal damage.

"All you need to see this damage is a pair of eyes," he says. "Nano-scale devices like this take advantage of their small size to do things that just wouldn't be possible on a larger scale."

"The marriage of bioengineers with cancer biologists is terrific. If we can work together to make assays more sensitive, we have a much better chance of detecting disease than using conventional assays."

The sensor works by screening the DNA passing through a nano-sized hole that Illinois engineers drilled into graphene using a laser. If the DNA is methylated, it will bind to the protein purified by Nardulli's lab, thereby taking longer to pass through the "nano pore" than other DNA.

"And that is how we'll know we have the methylated DNA," she says. "This is a test that could be done outside of the body. You take blood from the patient, and if DNA from prostate tumor cells is present in the blood, it would be detected by the nano pore."

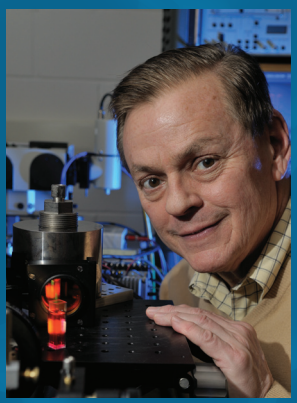
Once the nano device is developed, Nardulli says the next step is to test it on blood samples provided by the Mayo Clinic from both prostate cancer patients and healthy patients.

Nardulli brings small-town roots to the science of the small, for she hails from Hooppole—a community of only 275 in northwestern Illinois, so named because it used to make hoops and poles for barrels. She taught third and fourth graders for several years before making a dramatic career change, and twenty-some years later she is a nationally recognized expert in cancer. She is co-principal investigator, with Bashir, for the U of I's new Cancer Nanotechnology Training Center, which brings together 28 researchers from across campus.

"The marriage of bioengineers with cancer biologists is terrific," she says. "If we can work together to make assays more sensitive, we have a much better chance of detecting disease than using conventional assays. We're always looking for something new." □

NANODISCS

A 'wild idea' opens the doors of drug discovery.



"People thought we were nuts," says Stephen Sligar, when they first came up with the idea of a nanodisc.

A nanodisc is a 10-nanometer-long slice of cell membrane, stabilized by a protein that encircles it like a disc, says Sligar, an LAS biochemistry professor. To get a grasp of just how small these dimensions are, a typical virus is three to five times larger than the membrane found at the heart of a nanodisc. But today this small device is making big waves in the scientific community, especially when it comes to those elusive membrane proteins, which play a key role in drug development.

According to Sligar, more than half of the pharmaceutical drugs on the market today target proteins within cell membranes. Nevertheless, most of the membrane proteins out there have not been tapped as drug targets for one important reason.

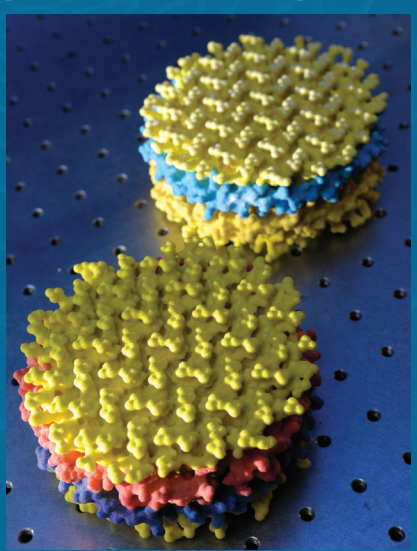
"Membrane proteins are extremely difficult to study because if you remove them from the cell membrane, they become inactive, they aggregate like scrambled eggs, and they die," he says.

Enter nanotechnology.

Banking on what Sligar describes as "a wild idea," his lab developed nanodiscs to fool the proteins into thinking that they are still inside a typical cell membrane within the human body.

"The membrane protein remains active in a nanodisc and can be studied much more effectively," he points out.

By making it easier to study membrane proteins, nanodiscs allow researchers to probe the vast number of possible pharmaceutical targets. Sligar's nanodiscs have also been used to create images of important biological processes, such as the first-ever picture of a newly born protein moving out of a ribosome and into a cell membrane, as well as images that show how blood-clotting proteins bind with cell membranes. Nanodiscs even have the potential to be used to deliver therapeutic treatments directly to cancer cells. With this much versatility, the U of I has been actively licensing the technology for all kinds of uses.



Like many other nano devices, nanodiscs are created when small particles "self-assemble," which is when isolated components come together to form organized structures. By manipulating certain chemical reactions, a nanostructure essentially builds itself at the molecular level.

According to Sligar, people were skeptical about nanodiscs at first, and they wondered, "How could this work?" But as he puts it, "Today some of the most important chemists studying self-assembly say that nanodiscs are the best example of self-assembly they know." ■

Illinois at the Crossroads

A Gift for the Ages — The Lincoln Hall Project — A Legacy Honored. A Future Preserved.

This is the fifth part in a series examining the evolution of higher education at Illinois since the construction of Lincoln Hall.

By Dave Evensen

The 1950s, 1960s, and early 1970s were a golden age for the University of Illinois. Enrollments boomed, giant building projects were planned and completed, and faculty added academic programs as college was increasingly touted as the ticket to success.

This new era, however, coming on the heels of the duty-bound World War II generation, brought with it contentious new attitudes toward American society and authority. As the Vietnam War heated up, the University struggled to balance the free exchange of ideas with a responsibility to maintain stability and order through some of the most divisive times campus—and the country—had ever seen.

Issues of racial equality, war, military recruiting, business practices, University ties to government, and other student grievances sparked years of unrest. Debates, speeches, rallies, and even violent protest broke out, prompting National Guard troops and riot police to clamp down on campus on more than one occasion.

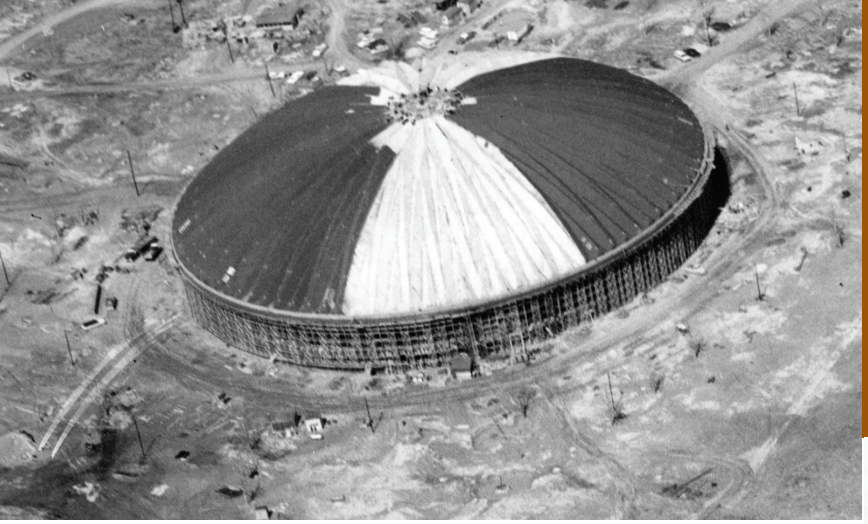
Keen observers may have sensed it coming. There were certainly signs. During quieter times, in 1957, there appeared a small notice that would have caused uproar 10 or 20 years earlier: The Senior Ball was canceled for lack of interest. It was more than the end of the big band era. It was also a subtle signal that old standards, expectations, rules, and assumptions were about to give way to the new.

A Shift between Eras

The often-overlooked 1950s had their light moments, with giant panty raids (police responded to one in 1953 that involved 1,000 students), the end of a 27-year-old ban on students having automobiles on campus, and a debate over cheerleading that ended in 1950 when the first female cheerleaders proved they could indeed energize a crowd. The decade also had its heavy moments. A biology professor started a nationwide debate—and lost his job—by stating in a newspaper letter that premarital sex between responsible college students was okay. Barbershops were boycotted in 1954 for racism, and legislators hunted for campus communists. One student editorial in 1950 urged legislators to focus on the Korean War rather than investigating "imaginary Communists in Champaign-Urbana." And it was during the 1950s when the towering elms on the Quad were removed as victims of Dutch Elm disease.

A President Takes a Stand

President George Stoddard arrived on campus in 1946 with much fanfare, and as time went on he proved popular with students and faculty. He didn't see eye to eye with the Board of Trustees, however, and their disputes came to a head in 1953 when a vice president of the University's medical colleges created a stir by announcing that he had discovered a drug to cure cancer, called Krebiozen. Medical experts doubted the claim, and Stoddard refused to allow research on the drug to occur on campus. The Board of Trustees disagreed, and Stoddard quickly resigned after the board delivered a vote of no confidence. He later reconciled with the University, returning for a ceremony in 1968 honoring his contributions to Illinois. Kriebozen was never proven to cure cancer and analysis showed that it was only an amino acid, creatine, dissolved in mineral oil.



Rapidly Building a New Future

Several dorms were built in the late 1950s and early 1960s as the University assumed a larger role in housing students. They included "skyscraper" dormitories such as Florida and Pennsylvania Avenue and Illinois Street residence halls, among others. Several academic buildings were also erected, including Roger Adams Laboratory (1950), Burrill Hall (1959), Morrill Hall (1960), the Psychology Building (1970), and the Foreign Languages Building (1971). In 1963, Assembly Hall, with its 12 million-lb. roof hailed as either an architectural marvel or a disaster waiting to happen, hosted its first men's basketball game, a victory against Iowa. In 1969, the Krannert Center opened, replacing Lincoln Hall as the center of campus theater.

Rewriting Rules for Women

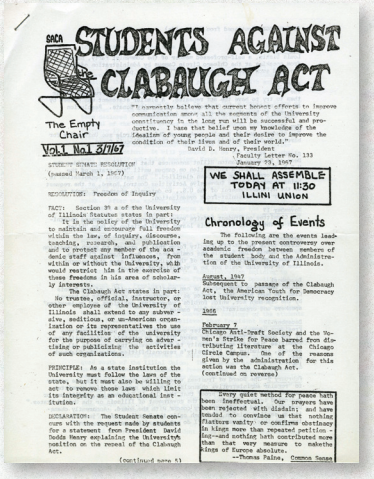
The University of Illinois had long followed the principle of *in loco parentis*—assuming the role of a parent—when it came to students, particularly women, who abided by rules on everything from sunbathing to dating behavior and obtaining parental permission for overnight trips. Students rebelled increasingly against such measures, with one controversial column in the *Daily Illini* in 1964 reading, "A 21-year-old University senior, supposedly highly educated, capable of deep understanding, and legally allowed to drink and vote, has restrictions placed on her that an 18-year-old high school dropout wouldn't have to put up with."

Bursting Enrollment

Close collaboration between universities and government during World War II lent credibility and relevance to universities such as U of I, and growing enrollments reflected it. Total University enrollments nearly tripled between 1950 and 1970. At Illinois, enrollment grew from 17,000 in 1950 to more than 35,000 in 1970 on the Urbana-Champaign campus alone. The growth was celebrated, but it also caused growing pains, with President David Dodds Henry lamenting in a September 1964 report, "The new academic year opens under the shadow of the grim fact that for the first time in its history, and at a time when the need for educated people is at its greatest, the University of Illinois has denied enrollment to several thousand qualified students."

The Clabaugh Act Runs Its Course

One of the era's defining laws was the 1947 Clabaugh Act, a state law and product of the "Red Scare" sponsored by State Rep. Charles Clabaugh of Champaign. The law prohibited universities from allowing on campus any "subversive, seditious, and un-American organization," or their representatives. Students, faculty, and administrators opposed the law nearly from the beginning on the grounds of free speech, and the issue came to a boil in 1967 when the University Board of Trustees refused to recognize the W.E.B. Du Bois Club for allegedly harboring Communist sympathizers. University students filed a lawsuit, and in 1968 a court struck down the controversial law.


SAC

STUDENTS AGAINST CLABAUGH ACT

The Empty Chair

Vol. 1 No. 1 3/1/67

WE SHALL ASSEMBLE TODAY AT 11:30 ILLINI UNION

Chronology of Events

The Following are the events leading up to the present controversy over academic freedom between members of the student body and the Administration of the University of Illinois.

August, 1947
Subsequent to passage of the Clabaugh Act, the American Youth for Democracy lost University recognition.

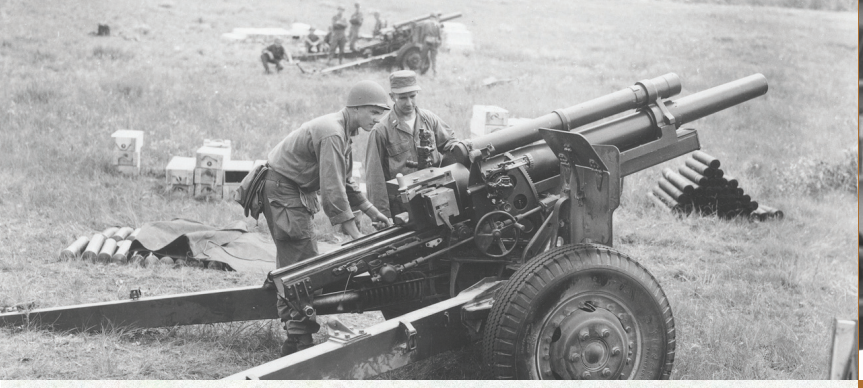
1966

February 7
Chicago Anti-Draft Society and the Women's Strike for Peace barred from distributing literature at the Chicago Circle Campus. One of the reasons given by the administration for this action was the Clabaugh Act.
(continued on reverse)

Every quiet method for peace hath been ineffectual. Our prayers have been rejected with disdain; and have tended to convince us that nothing flatters vanity or confirms obstinacy in kings more than repeated petition - and nothing hath contributed more than that very measure to make kings of tyrants absolute.
--Thomas Paine, Common Sense

Fight for Racial Equality

By 1967 only 372 black undergraduates attended the University of Illinois, out of 30,400. One historian notes that black students felt so excluded from the campus mainstream that they referred to the former University mascot as a "malicious" force, describing the academic failure of a peer by saying, "The Chief got him. He won't be coming back." In 1968, following the death of Martin Luther King Jr., more than 500 black and Latino students were admitted as part of Project 500.



An End to Compulsory Military Service

In 1963, following several years of studies by universities across the country and the Department of Defense, the Board of Trustees announced that compulsory military training for freshmen and sophomores would end. "I can hear the cheers in Urbana now," said Board of Trustees President Howard Clement.

Continuing Advances in Research

Research and class offerings expanded as the campus grew. In 1961, anthropologist Oscar Lewis published *Children of Sanchez*, an examination of poverty that gained worldwide attention. Biologist Arthur DeVries discovered "fish antifreeze" in 1964, explaining how fish could survive Antarctic waters. The study of entomology expanded greatly on campus during this era. In 1968, the University opened Prairie Observatory near Oakland, Ill., with a 40-inch telescopic lens. In 1969, African American studies originated on campus, and in 1970 the University offered its first course in women's studies. And it was during this era that chemist and Nobel Laureate Paul Lauterbur (above) pioneered discoveries that made possible magnetic resonance imaging (MRI).

Days of Protest

Student activism of the era had many roots, from prices at the local drugstore all the way to President Richard Nixon's decision to invade Cambodia. One particularly large protest in March 1970 stemmed from student grievances surrounding a new supercomputer on campus, Illiac IV, which would devote programming to the U.S. Department of Defense. At the same time, General Electric—a magnet for protesters—was recruiting on campus, and the Board of Trustees canceled a speech by the self-described "radical lawyer" William Kunstler. Windows were smashed, buildings were stoned, and someone planted firebombs in Altgeld Hall. Authorities summoned more than 1,000 National Guard troops and state police officers to campus, where they enforced a curfew and made more than 200 arrests. Illiac IV was eventually removed from campus and Kunstler was eventually allowed to speak.

Divisions between Students and Parents

Student protesters faced heavy criticism from parents and others who had come of age during World War II. When one group of U of I students sent a letter to their hometown newspaper calling for a nationwide strike following the Kent State University shootings in 1970, many readers responded, with one from a "worried mother," reading: "If the Japanese had been a little more clever, they could have overrun our country in a short time, and you students wouldn't be around to write your protest letters, or if you would be, you'd be under a government that wouldn't allow it.... If those four students would have been in their classrooms no one would

A Conflicted Response to Protest

University administrators were clearly conflicted on some student grievances. They created a "free speech" zone on the Quad, and they created committees on preserving the University's academic mission while following laws against "subversive" speech." Public meetings and debates arose often between students and administrators, and the Office of the Dean of Students created a thick file of articles trying to understand the students' point of view. One heavily marked report by Jerome Skolnick for the National Commission on the Cause and Prevention of Violence read, "If any generalizations can be made, it would be that student movements arise in periods of transition, when, for example, the values inculcated in children are sharply incompatible with the values they later need for effective participation in the larger society."

Sources: University of Illinois archives; College of Liberal Arts and Sciences; *A History of American Higher Education*, by John R. Thelin; *Black Power on Campus: the University of Illinois, 1965-1975*, by Joy Ann Williamson-Lott; *Illini Century: One Hundred Years of Campus Life*, by Roger Ebert.

See the entire higher education history series at lincolnhall.illinois.edu/history.

What Did Steve Do?

U of I grad takes readers 'Inside Apple' in his bestselling corporate profile.

By Holly Korab

Adam Lashinsky (AB '89, political science and history) chuckles when he recalls his skepticism toward Apple Inc. when he arrived in northern California in 1997 as a technology reporter for the *San Jose Mercury News*. Apple was the darling of Silicon Valley even though the company was near bankruptcy and Steve Jobs, its eventual savior, had only just returned to the company he had founded.

"As a business writer focused on finance, I didn't understand the big deal."

Of course, no one really did, not for another decade. Jobs was about to launch 15 of the most remarkable years in corporate history. He'd help raise Apple from the dead, inject it with start-up mojo, and inspire a stream of blockbuster products. Apple would become one of the world's most successful companies.

How Jobs achieved this corporate miracle, however, largely remained a matter of speculation until last January. Lashinsky, who was by then a senior editor at *Fortune* magazine and an Apple convert, released *Inside Apple*, a fast-paced corporate profile that revealed how Jobs worked his magic. Begun in 2010 as an article for *Fortune* magazine, the book breached Apple's heretofore impenetrable walls of secrecy and offered a candid glimpse of how Apple does business. It included, for instance, Jobs's rebuke of conventional management mantras and his gift for creating consumer-product bonds.

Though timed to follow the release of Walter Isaacson's bestselling biography of Jobs, Lashinsky's book was written without Job's blessing and consequently required some backdoor reporting—a skill Lashinsky had honed while reporting on Apple for two earlier articles in *Fortune* magazine. In fact, his first Apple story was a 2008 profile of Apple's then-chief operating officer and now CEO, Tim Cook. In it he scored such scoops as the Apple organizational chart, which Apple had never publicly released. He also bucked popular wisdom by predicting Cook's ascendency to CEO-ship despite his un-Jobs-like demeanor.

Cracking Apple's super secrecy was, according to Paul Merrion (AB '74, English), the Washington bureau chief for *Crain's Chicago Business* and the editor who gave Lashinsky his first reporting job, "akin to getting inside the Kremlin." Lashinsky attritubes it to good-old-fashioned reporting, calling upon sources he'd developed across the industry as well as dozens of mostly former Apple employees at all levels of the company. Jobs declined an interview.

Lashinsky has been declining a few interviews himself now that the book is a bestseller and he is in demand on the talk-show circuit—its a pleasant predicament for someone who once imagined himself as a history professor. Lashinsky discovered the rush of journalism at U of I's *Daily Illini* during his senior year and never turned back. He loves the "hurly-burly," he says, which his coverage of Apple has certainly provided.

Here are a few highlights from his book.

"Fun comes and goes."

In pulling back the curtain on Apple, Lashinsky showed that, like in Oz, perception doesn't match reality. Apple the company was anything but cool. Much like its products, it is, "cool on the outside, but an object of beauty that is the result of extreme precision and attention to detail." Similar to Disney, a corporation Jobs admired, the reality of what goes on behind the scenes is the opposite of its carefree public persona.

Secrecy is also practiced to the extreme. An employee can walk into work on a Monday, says Lashinsky, and find shaded glass where it used to be transparent—a clear sign, he says, you aren't involved in whatever is going on behind that door. And you don't inquire. This secret agent atmosphere squashes office politicking—except at the highest levels, people don't have enough information to bargain with it.

"Simplicity breeds clarity."

Jobs's obsessive attention to detail was combined with a penchant for simplicity. And simplicity meant saying no, something that Jobs was ruthless in doing if an idea didn't fit within his company's vision.

This insistence on simplicity permeates everything, says Lashinsky. Multitasking is out; focus is in. The corporate structure is streamlined. "Even marketing messages are honed to the point that everyone, from the media to consumers, can repeat them verbatim," says Lashinsky.

"I'll tell them what they need."

Among the practices at Apple that Lashinsky places into the category of "don't try this at home" includes the company's uncharacteristic approach to consumer research, which was not to. Designs and concepts were based on Jobs's concept of cool, and were proposed not for their profit potential but for their "awesomeness." Before he launched the iPad, Jobs famously quipped: "It's hard for [consumers] to tell you what they want when they've never seen anything remotely like it."

Of course, this implication of divine inspiration wasn't entirely true. Apple seldom was first with a product. "What Apple did was re-envision them with an almost insane attention to detail, particularly in design," says Lashinsky.

As for the future of Apple, Lashinsky avoids making forecasts. Ever the pragmatist, he observes that "even if Steve Jobs was still around, it's doubtful the company could have another 15 years like it had…I don't think any company can be insanely great for 30 years." ■

Adam Lashinsky's profile of Apple Inc. was the first to penetrate the company's walls of secrecy and reveal how one of the world's most successful companies works. Lashinsky has been a senior editor at *Fortune* magazine since 2001.

Voices From The Gender Divide

Researcher studies how an obscure minority gained its identity.

By Paul Wood and Dave Evensen

At the heart of Stephanie Hilger's research in comparative literature lies a love story. It starts in the mid-1800s with a young Frenchwoman named Herculine Barbin, who kept falling for the most unlikely people.

While studying at a convent Barbin was punished for slipping into a friend's room at night. At a different school, she fell in love with a teacher, and when she got a job teaching at a girls' school, Barbin fell in love with yet another teacher.

Photo by Thompson-McClellan

Her romantic life took a momentous turn in her early 20s when she saw a doctor about persistent physical pain. The doctor made a stunning discovery that would forever change Barbin's life, and eventually, some say, the lives of countless others. Within her body Barbin possessed male organs.

By that time people with physical characteristics of both sexes had long been a subject of medical discourse. What made Barbin's case a landmark moment, however, actually came a few years later, after Barbin assumed the identity of a male and, tragically, committed suicide. Next to his body they found his written memoirs, regarded as one of the first insights into life as an intersex individual.

The story strikes a theme in Hilger's work. Hilger studies how, over the course of a couple of centuries, intersex people—a modern term for hermaphrodites—have advanced from being the despairing, voiceless subject of autopsy reports to having their own articulate voice.

More broadly, Hilger's research shows how literature helps society come to terms with social issues that are difficult to talk about. Hilger says that through the written works that have emerged since Barbin's memoirs, including the Pulitzer Prize-winning 2002 novel *Middlesex*, most people can at least partly relate to an intersex person through the theme of being an outsider. It has slowly translated into a better quality of life for people with that condition.

"It's a way of talking about all kinds of other differences," Hilger says. "If you ask someone if they've ever felt that they were different, if people made fun of you, I think 90 percent would say yes. That becomes the way to connect to these texts."

As late as the 19th century, intersex individuals were only classified as such during post-mortem examinations, Hilger says, inspiring one researcher of the intersex condition to comment, "The only true hermaphrodite was a dead hermaphrodite."

Different forces, including the ripple effects from Barbin's memoirs, began undoing that notion. About 100 years ago, Hilger says, living intersex patient studies became more common because they were needed as documentation for legal petitions to change gender status.

With the gender question reaching the courts, intersex individuals became a feature in the old philosophical debate of nature vs. nurture. Karl M. Baer, a prominent author who was born female before he was reassigned as a male in the early 20th century, wrote under a pseudonym, N.O. Body, to tell his secret story and address the struggles of intersex individuals trying to settle in a two-gender society.

Intersex individuals gained sympathy, and Hilger says she noticed a "tension" in old doctor's reports as they seemed to struggle between the professional obligation to categorize an intersex individual through medical means, such as measuring their physical characteristics, and the person's own sense of identity.

At one time, it was assumed that the parents would make the decision at birth whether an intersex individual was a boy or girl, and a surgeon would make the necessary adjustments. Gradually through the 20th century, however, experts debated whether the child should decide for himself or herself. The Intersex Society of North America currently recommends assigning a gender to an intersex newborn, but refraining from surgery until the individual grows up and makes his or her own decision.

The issue fed into a larger issue about the patient's right to make informed decisions about treatment. Indeed, Hilger points out parallels between the intersex people who began writing about their experiences, and others, such as champion bicyclist and cancer survivor Lance Armstrong, who write about overcoming health issues.

People who overcome medical conditions often write so they can be more than "these objects in the hospital being passed around from one room to the next," Hilger says.

"Who has right to say what happens to your body?" Hilger asks. "Those are the questions these texts raise. In literature you really have a good way to think about that."

Through writing, intersex individuals made themselves easier to understand. And they began developing their own ideas of self—regardless of what surgeons had left them with.

TEMPLE OF THE GODS AND OF THE TOURISTS

Anthropologist studies Thai town grappling with its future.

By Doug Peterson

The temple tower rises high above the townscape of Phimai in northeast Thailand, pointing skyward like a gigantic, stone arrowhead. As you enter this ancient Buddhist temple from the south, you pass several enormous, lion-like, stone creatures that guard the symbolic "naga bridge," which links the world of people to the world of gods.

The irony is that this temple, the largest Buddhist temple in Thailand, may soon become a bridge to an entirely different world—the international community. And this link may bring a dramatic increase in tourists, a possibility that stirs concerns among the people of Phimai, the small town that has grown up around the temple over the past 1,000 years.

Thailand has put the temple on its tentative list of sites they are seeking to get on UNESCO's prestigious World Heritage List. When Thailand formally submits the ancient temple to UNESCO's World Heritage Committee, approval could dramatically transform this town of 10,000 forever, says Helaine Silverman, an LAS anthropology professor studying the site.

At one point, there was real fear that the Thai government was going to force virtually all of the residents to relocate so the temple grounds could be expanded and made more appealing for tourists. Although Silverman says it now appears that the government is going to expropriate fewer than 50 homes and businesses, the town could undergo dramatic changes. When a landmark is added to UNESCO's World Heritage List, the resulting influx of tourists can disrupt the way of life, changing the character of a place dramatically.

Helaine Silverman, University of Illinois anthropology professor, stands before the Buddhist temple in Phimai, Thailand. Silverman is studying the possible impacts on this 1,000-year-old town if the temple is added to UNESCO's World Heritage List.

Silverman spent last summer in Phimai talking to residents and taking an inventory of the town, going house by house to record the kind of businesses and homes presently there. She wants to get a complete picture of the town before its temple is added to the World Heritage List; then, she will return to get an "after listing" picture. The result will be the first study of a town before, during, and after inscription on the World Heritage List.

"Many scholars recognize the positive and negative impacts of being on the World Heritage List, but nobody has ever looked at how a town changes throughout the entire World Heritage process," she says. "Right now is the ideal moment to study Phimai."

Silverman is also director of CHAMP—the Collaborative for Cultural Heritage Management and Policy on campus—and she has done work at other World Heritage sites. For instance, she did research in Cuzco, Peru, once the capital of the Inca Empire. It has been a major tourist destination for decades and has undergone dramatic transformations.

"Its beautiful central plaza has changed from a centuries-old public space to an exclusively tourist space of commercial activity, where most local people cannot afford to eat in the restaurants or shop in the stores," she says.

"It's a known fact that when a site is inscribed on the World Heritage List, tourism increases significantly," she adds. She cites the historic town of Lijiang, China, which has seen a twentyfold increase in tourism over the past 20 years. "Lijiang had 150,000 visitors in 1991, and after being inscribed on the World Heritage List in 1997, the number rose to 2.8 million," she says. "Today, it receives almost 5 million tourists."

Silverman recognizes the potential economic benefits, but she argues that a dramatic increase in tourism "can introduce new pressures into ordinary social life, altering property values, forcing out residents, generating environmental problems, and diverting government money from other necessary investments." In the case of Lijiang, China, rising property values forced out 90 percent of its residents.

Photos courtesy of Helaine Silverman

Residents of Phimai, Thailand, are very proud of their town of 10,000. That is why some are wary of what might change if their Buddhist temple is added to the World Heritage List. Based on previous experience, when sites are added to the list, tourism dramatically increases.

If Phimai is placed on the World Heritage List, what happens next depends on many factors. Will there be tourism service taxes, and how much revenue will go to the town? Will large, multinational hotel chains drive out small guesthouses? Will tourism increase the cost of living in the town? And what changes will the Thai government make if it pours money into refurbishing the town, as is often done at World Heritage sites?

Silverman describes Phimai as "charmingly chaotic." Merchandise from shops spills out onto the narrow sidewalks, and the electrical wiring is "very creative," with wires hanging from posts like vines. Other than the magnificent temple, there is little to see in Phimai.

Although Phimai is located in the poorest region of Thailand, and there are significant income disparities in town, Silverman learned that it is economically viable with strong employment. Businesses range from small family stores to large agriculture and building supply enterprises that provision the surrounding area and several factories on the town outskirts.

Therefore, she asks, "What will an increase in tourism actually do for Phimai?"

Most importantly, she says the people are remarkably content and proud of their town. Residents often refer to themselves as Phimai, rather than Thai, because ties to their community are so strong.

"I love my town. It is peaceful and everything I need is here," said a high school senior who spent a year in Seattle as an exchange student and wants to be a doctor. "There is no pressure, and you can just be yourself. When I finish at the university, I will return here to live."

Silverman's team has been collecting tourism data, and right now she says the town would not be prepared for the massive influx of tourists who want to stay overnight. The infrastructure does not exist.

The general feeling among residents is that tourists are welcome, she says, but they don't want their way of life disrupted—a difficult combination. However, they may not have much say in the matter because the town lies within the ancient walls that once marked the temple's surrounding settlement. That means it is within the archaeological site, so its fate falls under the jurisdiction of the Thai government, which she says has strong incentives to get the temple onto the World Heritage List because of the prestige and "imagined benefit of development."

What makes the process difficult for local people, Silverman says, is that the residents of Phimai have been poorly informed about the government's plans to put their temple on UNESCO's World Heritage List.

"Local people are not being told much, and rumor is rampant," she explains. "Right now, all businesses and homes in Phimai are owned by Phimai people. But people wonder: What will happen in the future? They just want to live their lives, but everything is up in the air." ■

With a Little Help from My Friends

U of I geography professor Shaowen Wang is linking those with personal computers to the power of supercomputers in hopes of better understanding climate, predicting tsunamis, and endless other possibilities in what's shaping to be a new era in map and geospatial analysis.

With help from a multimillion National Science Foundation grant, Wang and his research team have been developing frameworks that connect users to a national, collaborative network of supercomputer resources—called cyberinfrastructure—that can process large amounts of geographical data at high speeds.

Wang foresees it greatly enhancing what users of common Geographical Information Systems (GIS), such as Google Maps, could do with their personal computers and even smart phones.

"The idea is this notion of cyberinfrastructure, meaning the sum of the parts is bigger than that of the individuals," says Wang, who is also a senior research scientist at U of I's National Center for Supercomputing Applications. "You don't worry about where the service is housed, how the services work; you just enjoy access to information and computing resources."

Wang founded U of I's Cyberinfrastructure and Geospatial Information Laboratory in 2007.

He anticipates more breakthroughs and wider usage of his software developments, such as the ability for smart phones to direct disaster victims along safe evacuation routes, and for meter-by-meter analysis of where climate change and floodwaters will impact.

Novelist Looks for Meaning and Mystery, Structure and Surprise

Photo by Rembert Brock

Alex Shakar was in Brooklyn, getting ready to leave his parents' apartment, when he first heard the news on the radio. He and his father climbed out onto the fire escape and clambered up to the roof, where they could see smoke pouring from the first of the Twin Towers. It was September 11, 2001.

When the first tower came down and Shakar absorbed this "sickening loss," everything that he had been filling his head with during the past year "snapped away like an idle minute's daydream," he recounted in an online essay.

Throughout 2001, Shakar had been absorbed with his first novel, *The Savage Girl*, which was due to be released only one week later. Now, 10 years later, September 11 is being remembered and Shakar has released his second novel, *Luminarium*, which takes place in 2006 during the period leading up to the fifth anniversary of 9/11.

The book explores science and mysticism in the wake of 9/11, which is ironic because Shakar often views his writing process as a collaboration between "the scientist and the mystic." When he begins working on a project, he does extensive research and outlining—the "scientist" part of the process.

"But then I'll start writing and immediately all of my outlining will go out the window," he says. "I'll try to stay in the truth of the moment of whatever is happening in a scene. I'll follow that thread wherever it takes me."

This is the "mystic" part of the writing process.

Eventually, though, he'll get lost in the story and will have to pull back and create a new outline before he resumes writing. Shakar continues this back and forth process, moving between the "scientist" and the "mystic" until the book is complete.

"By doing substantial rewriting, I wind up giving my stories a new backbone and a whole new heart and spine," he says. "I don't know if my approach is the most efficient process, but it helps me get elements of both meaning and mystery into the book. Both are essential for a successful piece of writing, especially a novel, which requires both structure and surprise."

Shakar says he is always striving to combine the best of both worlds—the scientist and the mystic. He compares this process to a scientist "who designs a highly experimental trial—perilous, but risky, but with the potential for great discoveries. Then, with no volunteers in sight, she enters the experiment as her own test subject."

Just as this scientist enters into her own experiment, an effective novelist structures the story and then enters into the world he has created. "At which point," Shakar says, "there may not be the slightest difference between science and faith."

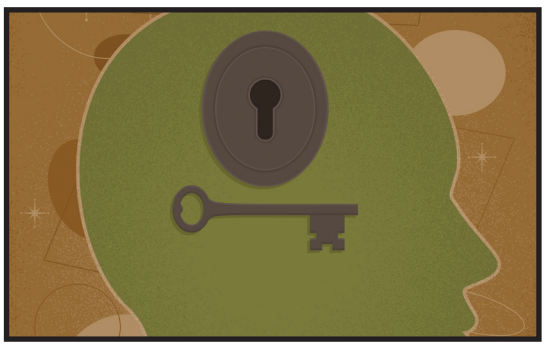
Thanks for the (Flawed) Memories

In the wake of the bombing of the federal building in Oklahoma City in 1995, authorities initially searched for a second bomber working with the perpetrator Timothy McVeigh. The manhunt was triggered when a key eyewitness claimed that another person was with McVeigh when he rented the truck that carried the explosives.

However, authorities eventually discovered that this particular eyewitness had combined two memories. He combined the memory of McVeigh renting the truck with the memory of another person renting a truck the day before; what's more, this second person just happened to be accompanied by someone who looked a lot like McVeigh. This case is just one example of how flawed our memories can be, says U of I psychology professor Brian Gonsalves.

"Memory is not like pressing 'play' on a video recorder and playing back an event in all of its detail," Gonsalves says. "It's more dynamic than that. Most often, we only remember bits and pieces of an event, and we're left to reconstruct the information."

During the reconstruction of memories, errors are likely to pop up for any number of reasons, such as the brain's poor encoding of a memory, the attrition of memory over time, or the planting of misinformation. In one Illinois



study, for example, Gonsalves found that they were able to plant misinformation and create false memories in subjects roughly about one-third of the time.

The researchers also monitored subjects with MRI to find out what was going on in the brain when a false memory was being created. They discovered that those who had false memories and those who had accurate memories showed roughly equal activity in regions of the brain that encode the general context of an event. However, subjects who had false memories showed lower activity in the fusiform cortex—a region that is important for encoding specific information.

This has implications in many areas, including eyewitness testimony, Gonsalves says. Some people may remember the general context of an event, such as that a robber held up a store, but they may not have encoded memories for specific details about the crime—such as that the robber was a male in his twenties wearing a red sweatshirt.

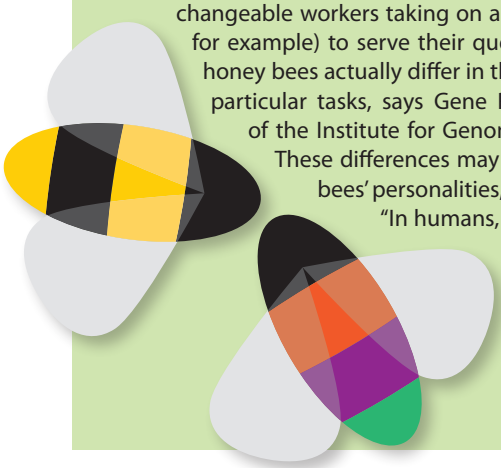
"Even though you have a general idea of what happened, you might not have been paying attention to the details, which is often the case in eyewitness testimony," he says. "Our research shows that this is when you are most susceptible to misinformation planted by lawyers or other people. The reconstruction of memories can be very prone to error."

Insects Have Personalities, Too

Thrill-seeking is not limited to humans and other vertebrates, according to a new study by U of I entomologists. Some honey bees, too, are more likely than others to seek adventure. The brains of these novelty-seeking bees exhibit distinct patterns of gene activity in molecular pathways known to be associated with thrill-seeking in humans, researchers report.

The findings offer a new window on the inner life of the honey bee hive, which once was viewed as a highly regimented colony of seemingly interchangeable workers taking on a few specific roles (nurse or forager, for example) to serve their queen. Now it appears that individual honey bees actually differ in their desire or willingness to perform particular tasks, says Gene Robinson, who is also the director of the Institute for Genomic Biology and who led the study. These differences may be due, in part, to variability in the bees' personalities, he says.

"In humans, differences in novelty-seeking are a component of personality," he says. "Could insects also have personalities?" Based on these results the answer is yes.



Modified Osteoporosis Drugs Can Fight Malaria

Osteoporosis drugs strengthen bones, but it looks like they can also be modified to strengthen the body's defenses against malaria.

The parasite that causes malaria has a knack for evolving resistance to the drugs used to combat it, so scientists are always on the hunt for new weapons against this deadly disease. Now, Illinois researchers have found possibilities among an unlikely source—Actonel (Risedronate) and Zometa (Zoledronate), the drugs used for osteoporosis.

These drugs are commonly used to fight the degenerative disease that reduces bone density, and normally they cannot cross the membrane of red blood cells to get at malaria parasites. But Illinois researchers chemically altered the drugs and found that they can safely kill the malaria parasite, even at low concentrations.

The modified form has a long "lipid tail" that enables the drug to pass through the lipid-rich membrane of red blood cells and bind to the parasite's target enzyme.

Getting News from the Internet Is Not All Bad

The Internet is changing the way people get their news, but there's little proof that it is fragmenting or polarizing the news audience the way many assume, says David Tewksbury, a U of I professor and head of the Department of Communication.

"Many things that we thought were going to be really horrible have not yet happened," he says.

Five years ago he was among those worried that the wide-open Internet would encourage people to put on "intellectual blinders."

Tewksbury feared that people would personalize their news habits and pay attention only to what they cared about, ignoring other news, especially about government and public affairs. He thought they would be shaped by highly segmented and opinionated news sources.

He's less pessimistic today. His latest research, with former Illinois doctoral student Jason Rittenberg, suggests that maybe half of online news consumers are very selective in what they follow, with more than half of those focused on sports. But the other half are seeking out a broad cross-section of news, which is better than what he and other researchers believed and feared, and in keeping with how people read newspapers.

Photo by L. Brian Stauffer

"We don't have a lot of evidence that public affairs knowledge is going down because of audience fragmentation," Tewksbury says. "Many people know quite a bit about what's going on. They are attending to news in a relatively uniform fashion. It's not as if everyone has suddenly become more ignorant than they used to be."

Instinct to Survive Drove the Success of America's First Ethnic Group

The Irish were essentially America's first ethnic group, with more than 3 million flooding into the United States between 1840 and 1890. By 1900, in fact, there were more Irish in America than in Ireland.

The Irish also became the model for other ethnic groups that followed, says University of Illinois historian James Barrett. As new immigrants from Europe arrived by the millions between 1890 and 1920, they encountered the Irish—Irish police, politicians, saloonkeepers, teachers, priests, union bosses, and gangsters.

As Barrett puts it, the newer immigrants had to deal with entrenched Irish Americans, whether they "wanted to save their souls, get a drink, find a job, or walk around the corner."

When the Irish first arrived, they faced hostility and prejudice and often were lumped in with African Americans at the bottom of the social order. But these struggles "produced a culture that mixed aggressiveness, a sentiment of grievance, a sensitivity to slights, and, above all, a strong instinct to survive," according to Barrett.

The Irish recognized that they needed to succeed as a group, so they developed defensive strategies and built organizations and institutions, notably the Catholic diocese and its allied organizations—the urban Democrats and the city labor movement.

In the competition for power and resources, entrenched Irish often excluded others from neighborhoods, jobs, political slots, and positions within the church. But Barrett says the Irish also helped newer arrivals adapt to the urban environment. Organizations that the Irish formed to fight anti-Irish discrimination were later adapted to fight immigration restrictions, the Ku Klux Klan, and intolerance against all immigrants.

Other groups also learned from the Irish how to form their own networks and institutions, so the Irish played a vital role in "Americanizing" newer arrivals.

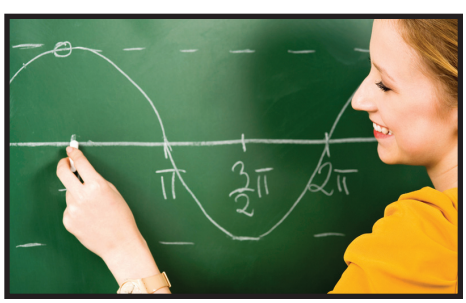
"A legacy of real and imagined slights shaped Irish Catholic consciousness," Barrett says. "They told themselves and others that their success was hard-won, that they must stick together and take care of their own."

Undermining Children's Skills

Does hearing that you are a member of an elite group—of chess players, say, or scholars—enhance your performance on tasks related to your alleged area of expertise? Not necessarily, say researchers who tested how sweeping pronouncements about the skills or likely success of social groups can influence children's performance.

The researchers found that broad generalizations about the likely success of a social group—of boys or girls, for example—actually undermined both boys' and girls' performance on a challenging activity.

The researchers hypothesized that exposure to broad generalizations about the abilities of social groups induces children to believe that success depends on "natural talent." If the hypothesis were correct, then hearing messages such as "girls are very good at this task," should impair children's performance by leading them to believe that success depends primarily on innate talent and has little to do with factors under their control, such as effort.



Forests Thrive with Switch to Local Management in Developing Countries

Relying on the eyes and ears of the local population may be one of the most effective ways to protect forests in developing countries, according to new research from U of I.

Historically, many governments in developing countries have tried to manage forests with inflexible rules that targeted large-scale illegal loggers. These efforts have not only failed—with an area of forest the size of a football field clear-cut by illegal loggers every two seconds, according to a recent World Bank report—but they have also made life difficult for the poor in communities that rely on the forests for their survival.

But that is all changing thanks to a growing trend toward the decentralization of forest management. In fact, research on 10 developing countries by U of I geography and geographic information science professor Ashwini Chhatre has found that shifting the control of forest management from a centralized bureaucracy to those living next to the forest has led to a comeback for forest cover in many places. And it has helped the local people.

"People who live next to a forest know more about what is going on, both in terms of who is cutting trees down or what is happening inside the forest," says Chhatre. "They have the most interest in making sure that bad things don't happen to the forests in their backyard—especially forests on which they depend."

Chhatre says the decentralization of forests in some developing countries has made it permissible for people in nearby poor communities to gather and sell certain commodities from the forest, such as wild honey, natural rubber, medicinal plants, Brazil nuts, or mushrooms.

"Under centralized bureaucracies, there was no flexibility that would allow a poor community to rely on the forest for food," he says. "Instead, they would spend enormous

effort keeping the people out with guns and fences. But it didn't make sense. You can't have enough guns and enough fences to protect every tree—especially if you don't have the local people on your side."

Sea Slugs Shed Light on Risky Decision-Making

What does the decision-making process of a cannibalistic sea slug have to do with the behavior of an out-of-control gambler burning through cash in Las Vegas or an addict snorting cocaine?

Sea slugs are shedding light on what's going on in the brain when higher vertebrates, such as humans, make high-risk decisions while seeking rewards in extreme situations—the kinds of decisions being made by people addicted to gambling or drugs.

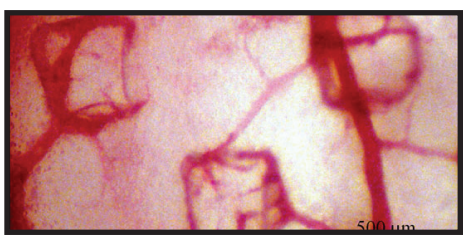
Rhanor Gillette, a molecular and integrative physiology professor at U of I, and graduate student Keiko Hirayama think they have identified a neural circuit in the sea slug that could be at the core of more complicated, risky decisions by humans.

The neural circuit in the sea slug governs attack and feeding behavior, which can be a life or death decision for these predators. When the neurons controlling this circuit become excited, slugs feel hungry, and they will go for nearly anything that smells like food. However, sea slugs still weigh this feeling of hunger against other information about the creature, such as its size or smell or previous encounters, before deciding to attack.

Humans face the same kinds of decisions and will sometimes take extreme risks when they are driven by a strong reward—such as the charge people get from drugs or gambling.

"This basic type of decision is subverted in humans through substance abuse and in illogical gambling, for example," Gillette says. "So studying the basis of this type of decision in a very simple animal helps us to work it out."

Bandage Spurs and Guides Blood Vessel Growth



U of I researchers have developed a bandage that stimulates and directs blood vessel growth on the surface of a wound. The bandage, called a "microvascular stamp," contains living cells that deliver growth factors to damaged tissues in a defined pattern. After a week, the pattern of the stamp "is written in blood vessels," the researchers report.

The potential applications for the new stamp are many, from directing the growth of blood vessels around a blocked artery, to increasing the vascularization of tissues with poor blood flow, to "normalizing" blood vessels that feed a tumor to improve the delivery of anti-cancer drugs. Enhancing the growth of new blood vessels in a coordinated pattern after surgery may also reduce recovery time and lessen the amount of scar tissue, the researchers say.

Astronomers Turn to Neighboring Galaxy to Better Understand Star Creation

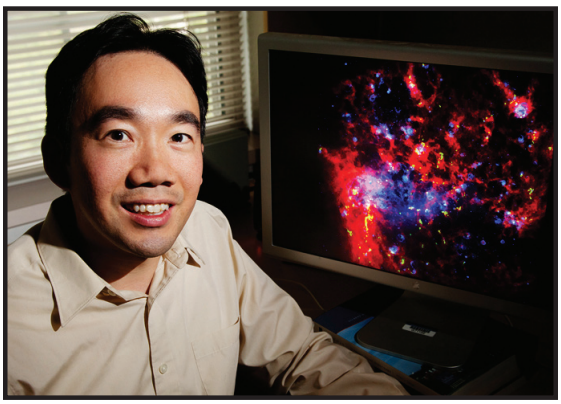


Photo by L. Brian Stauffer

No one ever said that star creation was simple. But astronomers led by a professor at the University of Illinois took a galactic-sized step toward understanding the process when they recently mapped star-birthing regions in an area of space that has long offered clues to the history of the universe.

Using a 22-meter-diameter radio telescope in Australia, an international team of astronomers mapped more than 100 molecular clouds in the Large Magellanic Cloud (LMC), a galaxy approximately 160,000 light years away that offers a spectacular view of the inner workings of a star system that is impossible for astronomers to obtain from our own Milky Way galaxy.

"If you imagine a galaxy being a disc, the LMC is tilted almost face-on so we can look down on it, which gives us a very clear view of what's going on inside," says U of I astronomy professor Tony Wong, who led the study.

What they found challenged conventional wisdom on star creation. Although astronomers have a working theory of how individual stars form, they know very little about what triggers the process or the environmental conditions that are optimal for star birth. Wong's team focused on areas called molecular clouds, which are dense patches of gas—primarily molecular hydrogen—where stars are born.

Conventional wisdom states that most of the molecular gas mass in a galaxy is apportioned to a few large clouds. However, Wong's team found many more low-mass clouds than they expected—so many, in fact, that a majority of the dense gas may be sprinkled across the galaxy in these small molecular clouds, rather than clumped together in a few large blobs.

The large numbers of these relatively low-mass clouds means that star-forming conditions in the LMC may be relatively widespread and easy to achieve.

Classics Professor Is Translating Massive Mythology Treatise into English

The lineage of every Greek god and every Roman god, along with the complex connections among them, was first spelled out in a set of 15 books written more than 600 years ago. Called *Genealogia deorum gentilium*, the massive compendium of more than 700 deities was assembled at the request of King Hugh IV of Cyprus by the Italian poet and scholar Giovanni Boccaccio.

To a classicist like Jon Solomon, the Robert D. Novak professor of Western civilization and culture at the University of Illinois, this rich resource seemed ripe for researchers. One hitch: It was in Latin. "It was such an interesting and influential text, I couldn't believe that it had not been translated," Solomon says.

He undertook the task himself, and the first of Solomon's three-volume series, *Genealogy of the Pagan Gods*, recently was published by Harvard University Press. A review in *Open Letters Monthly* described Solomon's translation as "a mighty achievement" and a "long overdue monument to its beloved author."

He plans to finish the second volume this summer, and then start on volume three.

Insects Offer Clues to Climate Variability 10,000 Years Ago

University of Illinois plant biology and geology professor Feng Sheng Hu collected core samples from Alaskan lakes. The abundance and diversity of midges—tiny non-biting insects closely related to mosquitoes—buried in sediments offer the first detailed record of temperature fluctuations that accompanied climate warming over the last 10,000 years. The analysis reveals that the region was significantly cooler than expected during the early Holocene epoch. (Photo courtesy of Feng Sheng Hu.)

For Those Who Can't Refuse a Good Story…

College of Liberal Arts & Sciences
Storyography

"The least we could do was to organize protests and to show the powers that be that we cared about this country and that we were going to question authority. Sometimes it got ugly."

— Carolyn Sharp Kelley
(AB '71, English education; AM '72, teaching of English)
on her experience as a student protester
at the U of I during the Vietnam War.

"It would be fine for maybe a week at a time. But then my joints would just start to ache like crazy, like I was already old."

—Brian Kung
(AB '11, East Asian languages and cultures)
describes living on campus in a car.

"I remember I think easily six days a week, sometimes seven days a week, I don't remember doing almost hardly anything else but going into the lab. It was like a complete dedication."

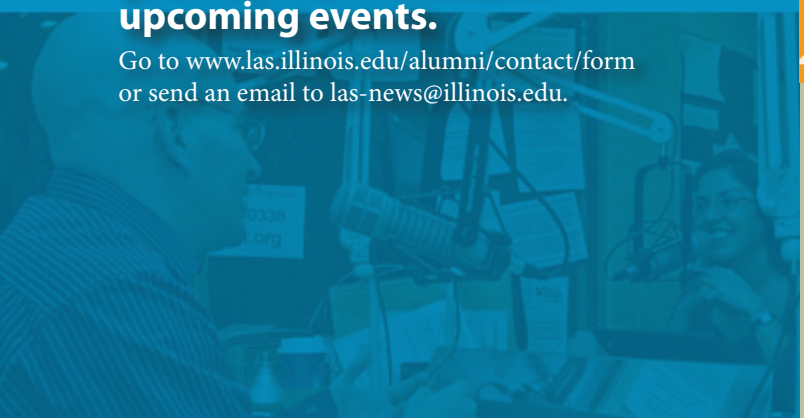
—Terry Balle
(PhD '80, chemistry)
discusses the life and untimely death of
promising chemistry professor Willis 'Bill' Flygare.

Listen, read, see photos, and learn how to contribute your own story about campus life at www.lincolnhall.illinois.edu/storyography.

Subscribe to LAS's Monthly E-Newsletter

Get more news, more alumni profiles, more notices of upcoming events.

Go to www.las.illinois.edu/alumni/contact/form
or send an email to las-news@illinois.edu.



LEAVE YOUR MARK ON LINCOLN HALL

Maybe you met your best friend in Lincoln Hall.
Maybe you just want to be part of this historic structure's future.
Engrave your name—or someone you wish to honor.
All proceeds will go towards scholarships!

WAYS TO LEAVE YOUR MARK

- **COURTYARD PAVERS**
  Help pave the way for a bright future.
  $300 to $1,200
- **COURTYARD BENCHES AND TABLES**
  Rest easy knowing that you've made a difference. $1,500 to $3,000
- **LINCOLN HALL THEATER SEATS**
  Permanently reserve your favorite seat in the class. $2,500
- **INSTRUCTIONAL SPACES AND OFFICES**
  Choose from classrooms, labs, advising suites, and historic spaces for your memorial.

Order Online:
www.lincolnhall.illinois.edu
or call (217) 333-7108

LINCOLN HALL TIME CAPSULE

Vote Now for Your Favorite Entry!

The nominations are in. Now it's your turn to select your favorite suggestion for what we should send to the future as part of the Lincoln Hall time capsule.

The alumna/nus who submitted the winning entry will be invited to place the time capsule in its permanent location in Lincoln Hall during a ceremony on Homecoming, Saturday, October 27, 2012.

Choose one of the following top five suggestions:

1. An I-Book from this year.
2. A printout of all the time capsule ideas submitted for this contest.
3. An i>clicker (an individual electronic device invented at U of I and now used by students and professors across the country for classroom interaction).
4. Photos of Lincoln Hall through the years.
5. A dried ear of corn (or at least a few kernels!).

Send your vote to: las-lincolnhall@illinois.edu
Deadline for voting: Noon on Monday, August 27, 2012

2063

ILLINOIS CONNECTION

Be part of a grassroots advocacy group for the University of Illinois and make your voice heard in Springfield. Learn more at www.ic.uillinois.edu.

College of Liberal Arts & Sciences
AT ILLINOIS

2111 South Oak Street, Suite 100
Champaign, IL 61820

Nonprofit
Organization
U.S. Postage
PAID
Permit No. 100
Champaign, IL

ILLINOIS

MARK YOUR CALENDAR

Lincoln Hall Open House

Celebrating a Gift for the Ages

Homecoming Weekend
Saturday, October 27, 2012
8:30 a.m.-5 p.m.

SELF-GUIDED TOURS ALL DAY

- Follow the map and signs, with hosts and hostesses on-hand to share more details. Don't miss the restored historical areas, fully modernized classrooms and offices, and features like a green roof that make this 100-year-old treasure a LEED Gold, sustainable building.
- Slide shows, videos, and other exhibits.
- Have your photo taken rubbing Lincoln's nose.

BRUNCH & TOURS WITH THE ARCHITECT (8:30-10:00 a.m.)

- Be our guest for brunch in the new café and courtyard.
- Join in guided tours with the architects and see highlights of the first floor and theater.

MARCHING BAND & TIME CAPSULE (~3:00 p.m.)

- Follow the Marching Band from Memorial Stadium or meet on the Quad-side of Lincoln Hall for music and the official placement of the Lincoln Hall time capsule.

Advance registration required for brunch.

Purchase your football tickets for the Illinois-Indiana football game, too!

www.lincolnhall.illinois.edu/events