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MU biochemist's award worth \$5.5 million

By Janese Silvey

Gerald Hazelbauer doesn't pretend to know whether his research findings will lead to new biotech or medical breakthroughs — that is for someone else to figure out someday.



G. Hazelbauer

The University of Missouri biochemistry professor for 40 years has been studying fundamental biological processes: how cells recognize chemicals, send signals and store information. In other words, life.

It's basic but high-risk research, and as a result, Hazelbauer has received a prestigious award from the National Institute of General Medical Sciences. The Method to Extend Research in Time, or MERIT, Award that comes with \$5.5 million over 10 years to fund Hazelbauer's research. The award aims to reward long-term investigators whose research competence and productivity are "distinctly superior" and to help them continue that work, according to the institute.

Hazelbauer is one of 11 MU researchers to have ever received the honor. The list also includes his wife, Linda Randall, a biological chemistry professor who received it in 1993.

It's a "nice honor" when a community of peers decides one's research is promising enough to invest tax dollars, Hazelbauer said. Then, to have the honor come with a "serious amount of money, that gives you some flexibility and freedom."

Hazelbauer has studied bacterial behavior since starting his doctoral work under Julius Adler, whose work led to the discovery that bacterial sensory behavior is based on a memory system. Hazelbauer continued the work, looking specifically at *E. coli*, although biological sensory processes are universal.

In explaining his research, Hazelbauer suggests thinking back to your childhood when you might have found an unfamiliar object in your backyard. A kid's first instinct is typically to poke the object and see whether it moves.

"There's something about being alive that means when your environment is perturbed, there would be a response," he said. "That's fundamental to every living cell and organism."

He studies those processes on the molecular and chemical level, figuring out how cells sense their surroundings and how they respond to something they have experienced before.

The work has implications because fundamental biological principles are preserved and built upon, he said, and in the long run could have real-world application.

That building-block research might not be easy to explain, but it has long-term value. He pointed to the 1960s and 1970s, when research funding dramatically expanded for the study of not only work with practical application but also basic biological functions.

"That funding was invested in the future, and it was very successful," he said, adding that work done then "gave us the scientific pre-eminence our country has today in the world."

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Summer students study nuclear forensics at MU

By MARÁ ROSE WILLIAMS

COLUMBIA -- On one side of the airtight, lead-lined doors, atoms are splitting, casting a bright blue glow inside the University of Missouri's nuclear research reactor.

In a laboratory on the other side, numbers measuring the half-life of nuclear isotopes tick down on the screens of a dozen computers.

Except for the low mumble of young researchers working to identify the isotopes, the only other sound in the lab is the steady, static beep from a Geiger counter that students will use later to check themselves for radioactive exposure.

All 10 of the students, here for a federally funded summer school, are studying techniques needed to become nuclear forensic detectives.

Think crime scene investigation, but instead of tracking blood and bullets to hunt down a perpetrator, these investigators would seek the origin of nuclear material such as enriched uranium or the even nastier, bomb-grade stuff — plutonium.

It's a skill that has taken on greater importance in the global war on terrorism.

One scenario: Federal law enforcers or border guards catch someone smuggling nuclear material into the country. Nuclear detectives, with the science to map the material's journey and pinpoint the exact reactor where it originated, are likely to be among the first responders.

But they also could act as a deterrent to any government or organization that might be tempted to sell uranium or plutonium on the black market, where it could end up in a terrorist's dirty bomb.

The problem is that there aren't enough nuclear science graduates to meet the growing demand for workers in the field, including nuclear forensics.

"After Three Mile Island and Chernobyl, society developed a negative feeling about nuclear science, and universities began doing away with nuclear and radiochemistry programs," said David Robertson, director of education and research at the MU reactor. Nuclear power in this country went into a long eclipse. Research jobs dried up.

On top of that, about 10 percent of the nation's nuclear scientists and radiochemistry experts are at or reaching retirement age, leaving a gap in that workforce at a time when reliance on nuclear energy has never been greater.

About a third of the U.S. population has been helped medically by some form of nuclear medicine, diagnosis or technology, said Jay Davis, president of the Hertz Foundation, based in Livermore, Calif. The foundation supports some of the nation's top Ph.D. students in the physical, biological and engineering sciences.

And 104 nuclear plants provide about 20 percent of the electrical power in this country. The Nuclear Regulatory Commission this year, for the first time in more than three decades, approved construction of a new nuclear power plant, in Georgia.

Nationally, enrollment in undergraduate nuclear engineering programs rose from 470 in 1998-99 to more than 1,300 at the end of 2008. Graduate enrollments climbed from 220 to more than 1,225 in the same period, according to the Oak Ridge Institute for Science and Education's most recent survey on nuclear engineering enrollments and degrees.

But the nuclear industry will need to hire about 25,000 nuclear scientists and technical specialists by 2015, the Nuclear Energy Institute says.

The Department of Homeland Security and the Department of Energy have called on two University of Missouri professors to help draw more students into nuclear science and radiochemistry. The two are being aided by grants worth about \$1.7 million from the two agencies to oversee summer school programs that encourage undergraduates to consider careers in nuclear science.

David Robertson, associate director of the MU Research Reactor, has received \$1.5 million to lead the Nuclear Chemistry Summer School at Brookhaven National Laboratory in Upton, N.Y., for the next five years.

Justin Walensky, assistant professor of chemistry, received a \$170,000 grant to run the six-week-long Nuclear Forensic Summer School in June and July in classrooms and laboratories inside the MU reactor center. The forensic program, funded by Homeland Security, is the only summer school of its kind in the nation.

It's the third year for the summer school but the first time it's been housed at MU. The feds take the program each year to a school with a research reactor or radiochemistry program on campus. MU has the largest university research reactor in the country. It's nearly twice the size of MIT's reactor, the second largest.

Walensky said the goal is for students to get comprehensive, experimental, hands-on training in topics such as nuclear decay, atomic and nuclear structure, nuclear material uses, the nuclear fuel cycle, radiation detection, standard analytical methods, and environmental radiochemistry.

Both summer programs have successful track records, Robertson said. "In the last two years, more than half of the nuclear science doctorates in the U.S. were awarded to graduates from these summer schools."

At MU this summer, the potential nuclear CSIs were handpicked from 60 applications from across the country.

Imelda Ko grew up in Brooklyn, N.Y., and is a junior at Bowdoin College in Maine. Until this summer she wasn't sure what she would do with the degrees she is pursuing in biochemistry and Chinese.

"I would have never had a chance to learn any of what I'm learning here, at Bowdoin," Ko said. "Bowdoin doesn't have classes where you can study radiochemistry. I really like this. It's really interesting stuff. I think now, who knows, I may work for the government. Maybe I'll work for the FBI."

Kevin Harvey, a junior at Catholic University of America in Washington, D.C., is a math major who said nuclear science "is brand new to me."

"I like it a lot," he said. "I especially love the chemical aspect. I could see working with nuclear pharmaceuticals some day. I know it sounds corny, but trying to find the cure for cancer."

Davis, who in addition to heading the Hertz Foundation is a nuclear physicist, lobbied federal officials in 1998 for funding to pay for a nuclear forensic program. "I had started getting the national labs to pay attention before 9/11," he said.

The program has gained a tremendous amount of interest since the terrorist attacks on New York and the Pentagon.

"Reinvestment in this field is quite important," Davis said. "Having both nuclear forensics and nuclear detection establishes a deterrent."

THE WALL STREET JOURNAL.

Animal Instinct: Paging Dr. Dog to Diagnose Disease

Many dogs can be trained to sit, fetch and roll over. Now, pups are being trained to detect disease and help patients in distress. **Rebecca Johnson, director of the Research Center for Human-Animal Interaction at the University of Missouri, explains how dogs can be useful in the medical field.**

DIABETES

Dogs can be trained to detect low blood sugar levels in diabetics by picking up scents that go unnoticed by humans. Upon detection, the dog springs into action—"kind of like sounding an alarm," Dr. Johnson says. Dogs may nudge the diabetic, fetch a blood-glucose monitoring kit or press a button on the phone to call 911.

SEIZURES

Researchers don't know what exactly enables a dog to detect seizures, but some dogs may notice a certain scent or subtle behavioral change that occurs right before an attack. Teaching a dog to pick up on these signs is difficult, Dr. Johnson says, and many seizure-response dogs simply have an innate ability to recognize when something is wrong. During the attack, dogs can seek help, move dangerous objects out of the way and lie next to the person.

PTSD

A relatively new type of service dog can aid people suffering from post-traumatic stress disorder. These dogs typically serve as companions to war veterans. Dogs can help ease the anxiety and panic that often comes with the condition by leading the way around a corner or positioning themselves between people and their handler. In a stressful social situation, the handler can signal the dog, which then barks loudly and gives the handler a reason to make a graceful exit.

CANCER

Dogs can also put their acute sense of smell to use by identifying certain cancer cells. Dr. Johnson notes that dogs have been trained to pick out bladder cancer cells by sniffing urine samples, while other researchers report that dogs have been able to identify lung and breast cancers by smelling patients' breath, and melanoma by licking their owners' skin.

COLUMBIA MISSOURIAN

Columbia, MU drop out of proposed broadband group Gig.U

By The Associated Press

July 9, 2012 | 11:10 a.m. CDT

COLUMBIA — The city of Columbia and MU are dropping out of a national effort to bring extremely high-speed broadband networks to research university communities.

The city and university announced last July that they were joining 37 research universities and their communities in an effort called Gig.U.

The city invested \$6,000 in the first phase. The university paid \$9,000 for a request for information from Internet service providers on the requirements for bringing ultra-high-speed broadband to Columbia.

The Columbia Daily Tribune reported that the city and university chose not to participate in the second phase of the project.

A university spokesman said two providers responded to the request for information. The city and university decided to continue private discussions with those two providers.

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Board of Curators approves plans to open new residence hall by 2015

The budget for the project is \$24.8 million.

By Brent Pearson

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The UM System Board of Curators finalized the plan for a new residence hall to accommodate students' rising demand to reside on campus.

Since 2001, the Department of Residential Life has worked to address expansion of residence halls at MU through the Residential Life Master Plan. This five-phase plan works to renovate and construct new living areas. The most recently constructed building dates back to the 1960s before the RLMP formed in 2001.

The new residence hall will accommodate the largest growth in enrollment MU has ever seen along with the increase in students interested in living on campus, Residential Life director Frankie Minor said.

"We are trying to increase our capacity now to meet our needs," he said. "It provides space that we surely need now and in the future."

According to the Department of Enrollment website, enrollment in fall 2001 was 23,666 students, beginning a 10-year streak of record-breaking enrollment. The fall 2011 enrollment was 31,745 students, and this record could be shattered again in fall 2012.

Incoming freshmen and current students who wish to live on campus use MU's Residents' Online Access to Rooms. According to the MU Residential Life Housing Policy, first-time college students less than 20 years of age as of Aug. 15 and are enrolled in more than six credit hours are required to live on campus. Some in the Class of 2016 are still struggling to find a room.

"I've looked for a room since the day ROAR permitted me to check for rooms," incoming freshman Mark Won said.

By this time last year, 90 percent of freshmen had a room, and 100 percent of freshmen had a room on opening day, according to the ROAR video on the Department of Residential Life website.

"Research shows students that live on campus as freshmen do better academically and are more likely to graduate," said Minor. "Students are recognizing the benefits of staying on campus — convenience, creating community, and doing better academically."

Residential Life limited the number of returning students able to live on campus to 1,000, turning away another 1,000 students this year. A waiting list for housing consists of 450 returning students, Minor said.

The Virginia Avenue South project, approved at the June 23 Board of Curators' meeting, has a \$28.4 million budget and will house 330 students. The hall will be funded primarily by revenue bonds. The residence hall will consist of 80 percent double rooms and 20 percent single rooms with community-style bathrooms.

"This is not a risky proposition at all," Minor said. "This will be full when we open it."

Construction on the residence hall is projected to begin in October 2013 and finish in Spring 2015. It is slated to open in Fall 2015.

The residence hall will be located between College and Virginia avenues north of the newly-constructed Hospital Drive. The residence hall has no formal name at this time.

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Gov. Jay Nixon signs Missouri's 2013 state budget

Concerns remain about whether the budget is fully balanced.

By Katie Pohlman

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MU mention page 2

Governor Jay Nixon approved Missouri's nearly \$24 billion budget for the fiscal year 2013 on June 22. The budget went into effect July 1.

Missouri's new budget focuses on increasing funding for an assortment of job training programs, maintaining funding for K-12 public education and providing extra funding for disaster recovery.

When the budget was first proposed, there was an estimated \$500 million revenue shortfall from last year. But with compromises such as a reduction in state funding of health care for blind Missourians and the passing of laws that allowed for casino revenue to fund veterans' homes around the state, the Missouri General Assembly was able to declare that the state's budget was once again balanced.

However, in signing the budget into law, Nixon announced an additional \$15 million in cuts, more than half of which come from the budget for higher education. At a press conference discussing the cuts, the governor justified the cuts.

"You only spend the money you have available," he said at the conference.

Nixon said he believes the budget is actually out of balance by around \$50 million and that future cuts may be necessary.

Nixon said extra funding need to be put toward disaster recovery due to the events of the past year, such as the Missouri River floods in spring 2011 and the Joplin tornado on May 22 that same year.

Early childhood programs and K-12 public education will now rely on proceeds from a national settlement with tobacco companies and state lottery revenue, respectively, for funding. Education will receive \$35 million from tobacco companies, according to an analysis by The Missouri Budget Project, a non-profit policy analysis organization. Lottery revenue includes selling tickets and collecting unclaimed prizes.

The budget predicts employment to increase 0.7 percent in fiscal year 2013. Along with introducing on-the-job training programs and investments to create jobs, the budget also calls for a pay increase for the state's lowest paid workers. This wage hike will affect more than 50,000 state workers.

Nixon had originally proposed much more drastic cuts to the higher education budget, but the general assembly blocked them.

Approximately \$8 million will be cut from higher education, making it the third straight year of cuts for colleges and universities across the state.

This includes a \$4.37 million cut in state funding for the University of Missouri System. According to a news release by the UM System, reductions in operating expenses and elimination of positions will result from the funding cut.

“We realigned our budget to put more money toward strategic priorities, strategic initiatives,” UM System spokeswoman Jennifer Hollingshead said.

The Missouri Budget Project’s analysis of the 2013 budget aligns with Nixon’s concerns that it is not actually balanced.

The organization says even though in theory the budget is balanced — meaning there is a designated source of funding for everything — the general assembly did not account for shortcomings in revenue or unforeseen expenditures. It points out that there are no reserves if those events were to happen.

“As a result, the FY 2013 may not be truly fully funded, which may necessitate \$150-\$200 million in mid-year budget reductions,” the report stated.

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Biochemistry assistant professor recognized for HIV and cancer research

Peter Cornish is the first at MU to be named a Pew Scholar.

By Brent Pearson

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Finding a treatment to HIV or cancer might not be far away for one MU professor.

Peter Cornish, a biochemistry assistant professor in the MU School of Medicine, became the first MU recipient of the Pew Scholar Award.

“The Pew Scholars Program in the Biomedical Sciences provides funding to young investigators of outstanding promise in science relevant to the advancement of human health,” the Pew Charitable Trusts website stated.

Cornish graduated from Graceland University with bachelor's degrees in biology, chemistry and mathematics in 2000. He received his doctorate in biochemistry from Texas Tech University in 2005. After five years of working in a post-doctoral program at the University of Illinois-Urbana-Champaign, Cornish arrived at MU in 2010, where he has conducted research on disrupting “protein factories” inside bacteria and viruses throughout the body.

“The ‘protein factory’ is called the ribosome,” Cornish said. “Through a process called translation, it reads a message and converts that into a protein sequence. So, all of the protein in the body is made by the ribosome. Using single molecule biophysics, we can investigate how the ribosome moves.”

HIV-1 produces necessary proteins through translation. A special event in translation called “frame shifting” occurs when a nucleotide gets inserted into or deleted from the sequence and alters the coding. Cornish had the idea to target this process by developing drug molecules. He said if successful, he could inhibit production of HIV.

“Our bodies’ natural defenses are constantly working to keep us healthy,” Cornish said in an MU News Bureau news release following the announcement. “We only get sick when the viruses or bacteria are able to replicate enough to overwhelm our defenses. If we can determine how to stop them from replicating, the body’s defenses can take over and get rid of the invaders naturally.”

Cornish’s research, if continued, might also apply to cancer — cells grow rapidly, meaning proteins must be produced quickly. Cornish said he could develop techniques similar to those in his HIV research to target cancer cells and their ability to produce proteins.

Scientists must first research the fundamentals of the ribosome and communication links among molecules before drug development can start.

Though his research is only at the molecular level, Cornish received national recognition through the Pew Scholar Award, which grants a \$240,000 prize awarded over four years.

"Peter is a thoughtful, careful and innovative young scientist," said Dr. Gerald Hazelbauer, MU biochemistry professor and department chair. "He is poised to make seminal contributions to our understanding of basic biological phenomena because he can combine his appreciation of fundamental molecular processes of life with an ability to understand and utilize emerging, cutting-edge techniques that are rooted in sophisticated physics."

The Pew National Advisory Committee received applications from 170 schools nationwide and selected 22 scientists for the award.

"I was pretty excited," Cornish said. "There is a name you can carry with it. It helps early on (in your career)."

Each university may only send one nomination per campus.

"Peter was an ideal candidate for MU because he had all the most desirable attributes — superb training, research that addressed fundamentally important issues in biomedical science and the utilization of an emerging, cutting-edge technology," Hazelbauer said.