Fall 2013

Art & Ecology

Artist Lisa Johnson explores the perceived value of our natural resources.

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ON THE COVER

WATER FOR TRADE: UI artist Lisa Johnson paddles a canoe on Lake Okoboji, near the UI's Lakeside Lab, having collected lake water to raise awareness of this natural resource. Her project focused on engaging with local residents, lake visitors, and lab scientists to gauge their perceptions of the value of water. Photo by R. Eric Stone.

Graduate Education at Iowa

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Cover—Art & Ecology

Notable graduate research

Features

Cystic fibrosis

Impact on the nervous system

Leah Reznikov's research project was not an easy sell to her colleagues in Professor Michael Welsh's laboratory. Could cystic fibrosis (CF) really affect the nervous system?

"We're all trained skeptics. Every time I would bring this up, they would say there is no nervous system phenotype," says Reznikov, a postdoctoral fellow in internal medicine.

CF is an inherited life-shortening disease that affects the lungs and digestive organs.

Still, Reznikov continued to pursue her hypothesis. After four years of research, Reznikov and her University of Iowa colleagues published a study in the Early Edition of the Proceedings of the National Academy of Sciences suggesting that the cystic fibrosis mutation affects the nervous system and might directly cause neural abnormalities experienced by some people with CF.

"I truly believe that what I found might have implications for disease," says Reznikov, a native of LeMars, Iowa. "I don't know how it's important yet, but I feel that it needs to be further explored to determine its importance."

Using a porcine (pig) model of CF, the UI team showed that the protein affected in CF, the cystic fibrosis transmembrane conductance regulator (CFTR), is expressed and functions in Schwann cells—a type of cell associated with nerves. These cells produce myelin, a fatty substance that insulates nerve fibers and allows efficient transmission of nerve signals.

The study shows that loss of the CFTR protein directly alters Schwann cell function and leads to subtle structural abnormalities in the myelin surrounding the nerve fibers. These abnormalities, although significantly milder, resemble myelin defects seen in human neuropathies.

"I was surprised by Leah's discoveries. Her findings certainly increased my appreciation for the complexity of the disease, and they have important implications for therapeutic approaches," says Welsh, professor of internal medicine. "I was also impressed by her creativity and insight in pursuing this research."

Reznikov's next step is to look for nervous system involvement in airway diseases. She applied for a grant from the National Institutes of Health to help fund this endeavor.

"Maybe defects of the nervous system affect the size of your airway, and that might be important for obstructive airway diseases like asthma," says Reznikov, a two-time poster session winner (2012, 2013) in the Carver College of Medicine Staff and Postdoctoral Fellow Category during UI Health Sciences Research Week activities.

Journey to the UI

Reznikov earned her bachelor's degree in biology at Iowa State University and a Ph.D. in neuroscience at the University of South Carolina before beginning her postdoctoral appointment at the UI.

Working for Welsh, a Howard Hughes Medical Institute investigator, has been professionally rewarding for Reznikov.

"It is truly inspiring. He never loses his excitement for science," Reznikov says. "You can see the excitement on his face. He's enthusiastic, so he inspires enthusiasm in other people."

Reznikov exhibits that enthusiasm as she mentors graduate students in the lab.

"I really care about people and want to see them be successful," Reznikov says. "It's satisfying in terms of being able to help somebody."

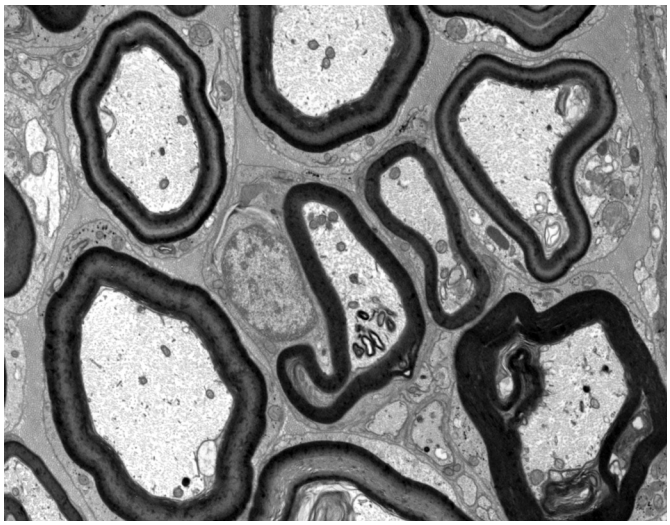


Image shows electron microscopy of myelin abnormalities caused by CF mutation. Image provided by Leah Reznikov.

Autism

Looking for "the big picture"

"What I find interesting is that many people with autism have IQs in the normal range, yet they do poorly socially."

—Heather Robinson

Heather Robinson does not limit her research training to the laboratory. She knows there is much to learn beyond the walls of University of Iowa Hospitals and Clinics.

For two years as an undergraduate, Robinson volunteered at Big Brothers Big Sisters of Johnson County where she mentored an 11-year-old girl.

"It's really rewarding to be a mentor for someone. You give to them, and they give to you," says Robinson, a Ph.D. student in clinical psychology at the UI and a Dean's Graduate Research Fellow. "I learned a lot about being open and being receptive to other people's perspectives. That has really helped my research during my graduate school career."

Through her volunteer experience, Robinson learned why she loves working with children. "They're excited and they're curious. They're a lot like me," Robinson says. "I can be imaginative at times. I get that giddy excitement."

Robinson carries this enthusiasm and curiosity into her scientific work. With a keen interest in studying empathy and the brain, she began graduate school at the UI, eventually finding her current research focus on the social deficits of autistic children.

Autism is a neurodevelopmental disorder characterized by impaired social interaction and communication, as well as repetitive behaviors and restricted interests.

Robinson investigates the relationship between executive functioning and weak central coherence theory in autism spectrum disorders. Weak central coherence theory suggests that a limited ability to understand context or to "see the big picture" underlies the central disturbance in autism and related autism spectrum disorders.

"What I find interesting is that many people with autism have IQs in the normal range," Robinson says. "Despite having normal cognitive abilities, they do poorly socially. I want to know what's different about their social abilities."

Robinson works with her mentor, UI Neurology and Psychology Professor Dan Tranel, on the neuropsychology and neuroimaging aspects of the project. She also collaborates with clinical psychiatry professor Todd Kopelman and clinical psychologist Kelly Pelzel to recruit study subjects from various University of Iowa clinics.

Hometown Hawkeye

"Where you come from," Robinson says, "really does shape how you see things."

Robinson grew up in Hamburg, Iowa, population 1,187. The town is in the far southwest corner of the state, hugging the borders of Missouri to the south and Nebraska to the west.

"Growing up in Hamburg taught me a lot about how to work hard. I worked throughout high school and college," Robinson says. "My mom worked two jobs. I worked with her at a restaurant. I was taught how to work hard and how to generally be nice and helpful to people."

After attending Northwest Missouri State University for two years, Robinson transferred to the University of Iowa to complete her undergraduate degree. She worked as a research assistant in Tranel's lab for two years.

"In Heather Robinson, I see a little bit of myself," says Tranel. "I see someone from a modest background who is excelling at a major place. I see someone who is resourceful, and someone who has the right amount of confidence and risk taking. You have to be a risk-taker to throw yourself into a major-league situation. You need a little bit of chutzpah."

Tranel grew up in southeastern Montana, where the nearest major hospital and movie theatre were 120 miles away. He attended high school on a reservation with members of the Northern Cheyenne and Crow tribes, one of a handful of white kids at the school.

For three-plus decades, Tranel has called the Iowa City area home. Robinson also has grown fond of the Home of the Hawkeyes.

"At the University of Iowa, I've become more me. I've been provided the opportunity to find out what I really like," Robinson says. "I meet people from different backgrounds than me. My roommate is from Puerto Rico and speaks two languages. This is where I can make my mark. We all have the ability to make a difference in our own way."

Brain's power to heal

Surgery affects neural networks, leads to improved epilepsy treatments

Surgery may be an option for some people whose epileptic seizures are not controlled by medication. In patients whose seizures are caused by a clearly-defined area in the brain, the success rate of surgery is as high as 80 percent.

However, when doctors remove the area of the brain producing seizures, other undamaged brain regions can be impacted. This can cause complications, such as reduced visual field, difficulty speaking, more seizures, and partial paralysis.

Matthew Sutterer, a Ph.D. student in the Interdisciplinary Graduate Program in Neuroscience, seeks a better understanding of how surgery can alter the functioning of large-scale brain networks. His goal is to uncover key information that will improve treatments for epileptic patients. Sutterer's research is funded by a National Research Service Award (NRSA) from the National Institutes of Health.

Sutterer investigates brain reorganization and recovery of higher cognitive functioning (e.g., language, emotion) in epilepsy patients before and after focal brain damage.

"We see some patients go through the surgery with virtually no changes in cognitive or emotional measures, while other patients show a decline in these measures following surgery," Sutterer says. "Looking at patients before surgery and following surgery gives us a better understanding of how the functional reorganization may be related to behavioral and cognitive outcomes."

Sutterer, a Presidential Graduate Research Fellow, adds that better understanding of postoperative brain plasticity and brain function recovery can inform rehabilitation approaches for patients with multiple classes of neurological disorders or disease.

Through the course of his research, Sutterer will study patients at three points in time: pre-surgery, immediately after surgery (acute), and six months after surgery (chronic). This testing method will provide information about time of recovery and connectivity among brain regions. Patients are members of the world-renowned Iowa Neurological Patient Registry.

"This project is uniquely suited to Iowa, because of the combined presence of a rare neurosurgery research group and the support of the Iowa Neurological Patient Registry," Sutterer says. "We will be assessing patients with focal brain damage, including epilepsy surgery patients."

Sutterer hypothesizes that higher connectivity within language and emotion networks will predict greater acute postoperative declines in language and emotion measures, while greater increases in network connectivity between acute and chronic postoperative time periods will predict greater improvement in language and emotion measures.

NRSA Awards

The National Research Service Awards (NRSA) is a family of grants provided by the National Institutes of Health for training researchers in the behavioral sciences and health sciences. They are a highly selective source of funding for doctoral and postdoctoral trainees.

Sutterer's proposal scored high in the competition, placing in the second percentile of all applications. However, rather than emphasize his personal accomplishment, Sutterer points to the importance of neuroscience research.

"Ultimately, it's a bigger picture than just me and a particular award," Sutterer says. "It's the idea that the science will help us understand how the brain reorganizes following damage, and ideally that turns into something that helps patients."

Sutterer says the Interdisciplinary Graduate Program in Neuroscience's policies helped him create a more competitive NRSA proposal.

As part of its comprehensive examination process, the program requires graduate students to submit a research plan, which gave Sutterer a head start. "I was sort of keyed into the [proposal application] mechanism that way. The old way, people would spend a month or two, not doing research, but studying for the examination. Now, you can tailor it to your work and make it applicable," says Sutterer.

Sutterer's mentors are Dan Tranel, professor of neurology and psychology and director of the Neuroscience Program, and Matthew Howard, professor of neurosurgery. In the NRSA Award summary statement, reviewers praised Tranel and Howard as "world-class sponsors with outstanding track records and complementary skill sets and backgrounds."

UI Grad Success

New services for Iowa graduate students

What tools do grad students need to start planning their careers?

With the Graduate College's new UI Grad Success Services, Iowa's graduate students can access a professional development services online and book appointments with Graduate College staff to explore their career options and get help with applications for external funding.

UI Grad Success Map

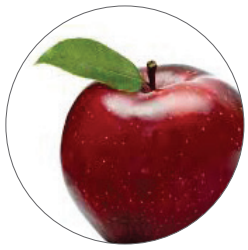
What are your questions about graduate education at Iowa? Explore our UI Grad Success Map to learn about decisions that lie ahead, anticipate deadlines, and find ways to optimize your career prep opportunities. Use the UI Grad Success Map to ensure you're staying on track and aware of all the UI Grad Success resources at your disposal

Grants and Fellowships

The Office of UI Grad Success will help you de-mystify the fellowships application process. Funders such as the National Institutes of Health, The Social Science Research Council, The National Science Foundation and others, fund graduate student research, but it's essential that you start early. Contact us for a search appointment, a proposal review, or class visit to help you prepare for nationally competitive grants and fellowships.

Career Development

It's never too early to think about your future. Whether you are just beginning graduate school or getting ready to hit the job market, the Office of UI Grad Success can help you prepare for careers inside and outside of academia. We can help students develop their professional online identity, identify their strengths and transferable skills, and learn about types of employment beyond universities. In addition, students preparing resumes, CVs, cover letters, or other job application materials can bring them to us for help with content and formatting.



Teaching

The Center for Teaching supports your efforts as a teaching assistant at The University of Iowa. Their services are free, voluntary, and confidential, and include individual consultation, classroom observation, workshops, and faculty institutes. The Center for Teaching web site provides strategies for designing courses, teaching courses, and assessing student learning.

Writing

The Writing Center offers assistance to all members of the university community, helping to improve writing skills and boost attitudes and self-confidence about writing. They offer services including semester-long tutoring programs with weekly meetings, as-needed single appointments, online tutoring, and online help with specific writing questions.

Visit www.grad.uiowa.edu/ui-grad-success-services

Prize-winning research

Three UI graduate students earn top honors

Competing in a university-wide competition, three UI graduate students have earned top honors for best dissertation in their fields in 2013.

The Graduate College honored Eliot Shearer with the inaugural Rex Montgomery Dissertation Prize, which recognizes excellence in doctoral research at the University of Iowa in the area of disease prevention and/or the translation of research into clinical practice. The Rex Montgomery Dissertation Prize will be awarded annually in the biomedical and health sciences disciplines.

Montgomery is an emeritus professor of biochemistry in the UI's Carver College of Medicine (CCOM). He began at the UI as an assistant professor in 1955 and became a full professor in 1963. Montgomery was associate dean for academic affairs in the Carver College of Medicine from 1974 to 1995, while also serving as associate dean of research in the CCOM and interim vice president of research.

> **"Iowa has had five national dissertation winners, more than any other public institution."**

The Graduate College honored Daniel Collier and Melissa Moreton with the Spriestersbach Prize, which is named for Duane C. Spriestersbach who served as Graduate College dean from 1965 to 1989. When the prize was founded over 30 years ago, Spriestersbach hoped it would "serve as tangible evidence—as 'gold standards'—of the outstanding work of which graduate students are capable and to which all others should aspire."

Winners of the Spriestersbach and Montgomery Prizes are the UI's nominees for the Council of Graduate Schools (CGS)/University Microfilms International (UMI) Distinguished Dissertation Award. This national award is the most prestigious dissertation prize in the country.

Iowa has had five national winners, more than any other public institution. Thirteen more Iowa nominees have been finalists in the national competition. CGS has presented 45 awards across all disciplines since the award's inception.

Daniel Collier

Biological & Life Sciences
Spriestersbach Prize Winner

Collier discovered a feedback mechanism in cells that affects blood pressure. He has gone on to define the molecular interactions that can be used to control the problem.

Melissa Moreton

Humanities & Fine Arts
Spriestersbach Prize Winner

Moreton's research reveals the scholarship and artistry of Renaissance women whose work was significant in furthering that era's humanist revival and whose influence is still alive today.

Eliot Shearer

Biomedical & Health Sciences
Montgomery Prize Winner

Shearer utilized technological advances in DNA sequencing to simultaneously screen all known deafness-causing genes, making diagnostic testing more cost-effective for patients.

Photo by Melissa Moreton.

What causes h

"Dan's work suggests novel therapeutic strategies to treat hypertension and other diseases."

—Peter Snyder, professor of internal medicine at the UI

High blood pressure affects one in every three adults in the United States, according to the American Heart Association. In 2009, 44.8 percent of male deaths and 55.2 percent of female deaths resulted from high blood pressure.

Despite these high morbidity rates, the underlying cause of high blood pressure, or hypertension, is unknown in most patients.

One way our bodies regulate blood pressure is through balancing the amount of sodium retained at the cellular level. Daniel Collier's research at the University of Iowa focuses on understanding how a protein called the epithelial sodium channel (ENaC) regulates sodium excretion and sodium reabsorption in the kidney collecting duct. Some hereditary forms of hypertension are due to defects in ENaC activity.

Collier's outstanding publishing record (eight articles in the last four years) and significant contributions to his research field led to winning the 2013 D.C. Spriestersbach Dissertation Prize in the biological and life sciences category. His dissertation is titled "Regulation of Epithelial Sodium Channel (ENaC) Activity by Extracellular Stimuli."

Collier, who earned his Ph.D. in molecular physiology and biophysics in 2011, has identified new stimuli that regulate ENaC. His research also explains how ENaC works to help cells adapt quickly, adjusting rates of sodium absorption in response to changes in sodium intake.

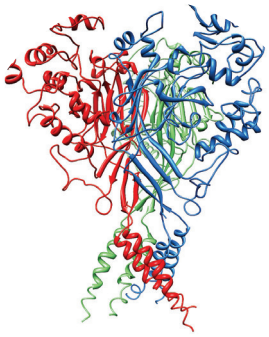
"Dan's thesis project provided novel insights into the structure of ENaC and the dynamic molecular mechanisms that control channel gating," says Christopher Benson, associate professor of internal medicine and collaborator with Collier on several projects. "His work has important implications for understanding and treating diseases such as hypertension and cystic fibrosis."

The Spriestersbach Prize is named for Duane C. Spriestersbach, who served as Graduate College dean from 1965 to 1989. When the prize was founded over 30 years ago, Spriestersbach hoped it would "serve as tangible evidence—as 'gold standards'—of the outstanding work of which graduate students are capable and to which all others should aspire."

The discovery

Collier's research career started with a simple observation that other scientists in the field had overlooked.

"No one had recognized that ENaC was pH sensitive," says Collier, a native of Newton, Iowa. "A lot of people used mouse or rat ENaC, so they could use mouse or rat models. Our lab tends to use ENaC from human complimentary DNA (cDNA). That opened new doors for us to go back and compare humans with mice and rats. This led to more discoveries."



COLLIER'S DISCOVERY
ENaC is pH sensitive, and this pH sensitivity can be used as a tool to control the activity of ENaC, which serves as a gateway for the release of sodium from the kidneys.

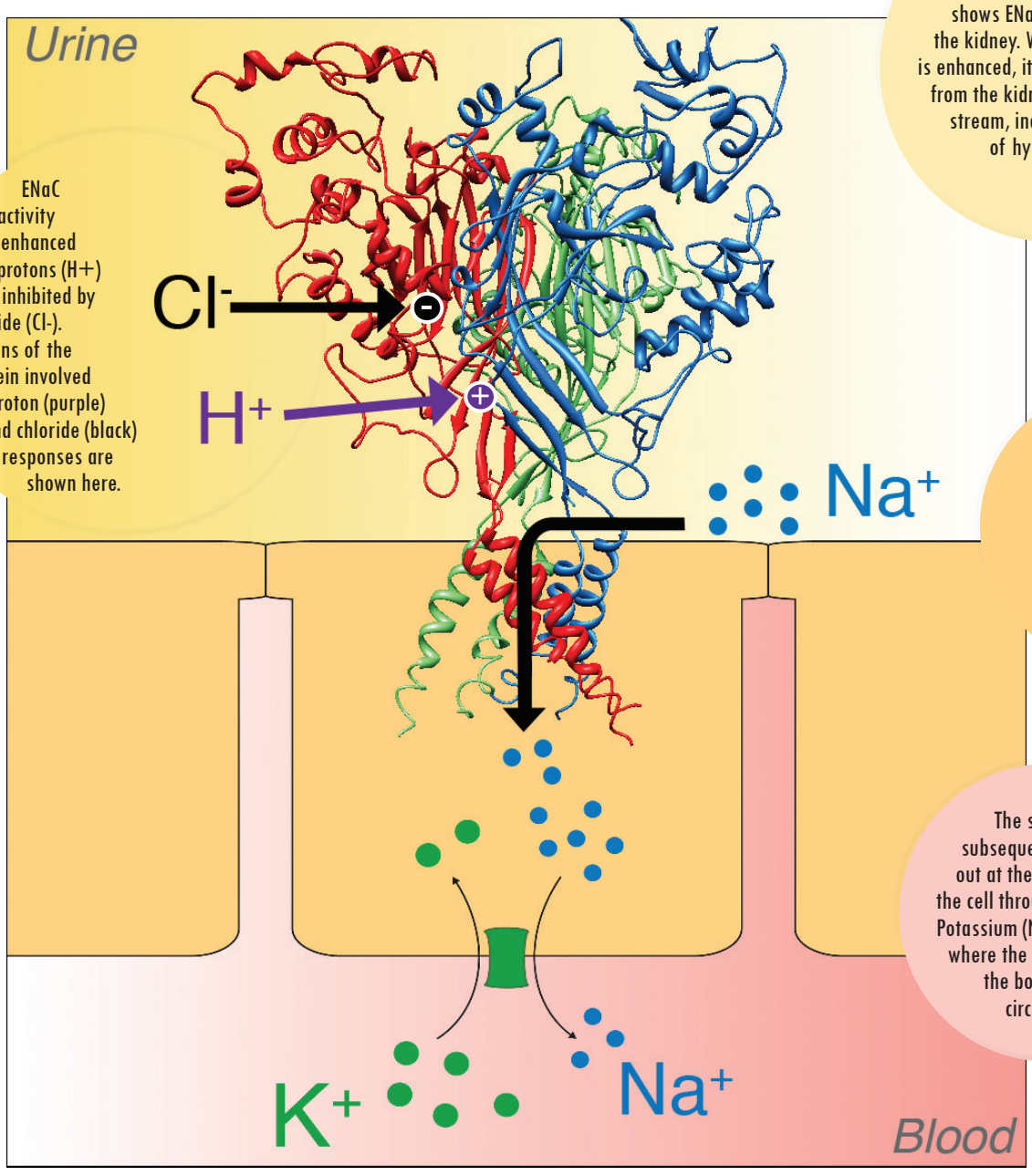
Collier discovered that although human ENaC are activated by acidic pH and inhibited by alkaline pH, rat and mouse ENaC are not. He then developed a strategy for identifying the amino acids that allow pH to regulate ENaC. From there, Collier discovered how proton binding activates ENaC.

"Dan's work begins to teach us about the dynamic changes that control ENaC activity," says Peter Snyder, professor of internal medicine and Collier's dissertation advisor.

—Continued on page 12

hypertension?

ENaC IN ACTION



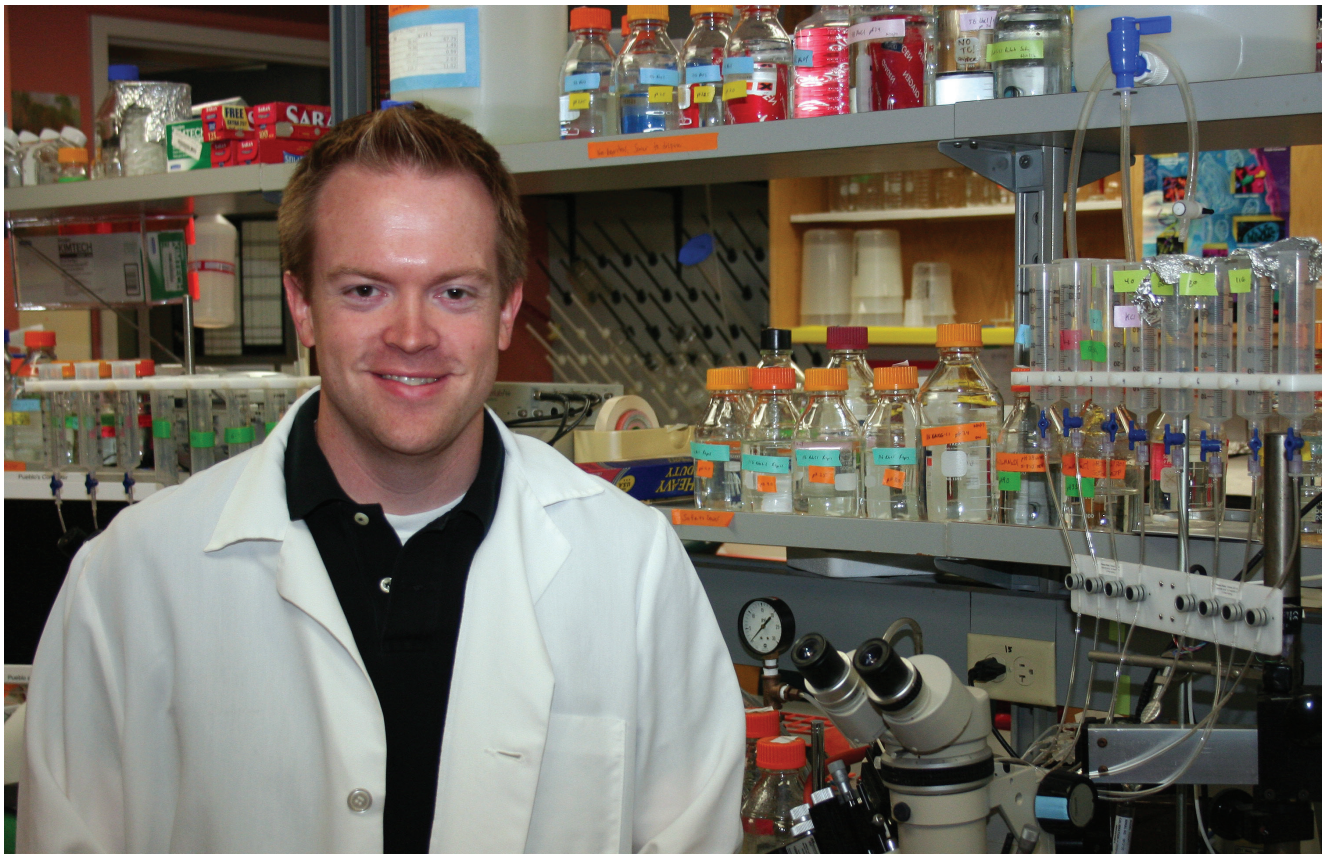
This diagram shows ENaC activity inside the kidney. When ENaC activity is enhanced, it pumps more sodium from the kidneys into the blood stream, increasing the risk of hypertension.

ENaC activity is enhanced by protons (H+) and inhibited by chloride (Cl-). Regions of the protein involved in proton (purple) and chloride (black) responses are shown here.

Sodium (Na+) from the cavity of the kidney enters epithelial cells of the cortical collecting duct through ENaC.

The sodium is subsequently pumped out at the basal side of the cell through the Sodium/Potassium (Na+/K+) pump, where the sodium rejoins the body's blood circulation.

Structural model provided by Daniel Collier



COLLIER: Researching how ENaC activity can be regulated to treat hypertension and other diseases.

"His work provides a framework to investigate new mechanisms that may lead to human disease and suggests novel therapeutic strategies to target ENaC activity in order to treat hypertension and other diseases of disordered extracellular volume control."

Collier hypothesized that ENaC senses changes in the extracellular environment. He viewed chloride as an attractive candidate for regulating ENaC activity since its concentration is very low during volume depletion, but becomes elevated with volume excess.

A possible solution

Increased extracellular chloride decreases ENaC activity. Collier speculates that low chloride levels would therefore promote sodium reabsorption and contribute to high blood pressure, and elevated chloride levels may have protective effects.

Collier also found that protons and chloride both interact with specific binding sites in the extracellular domain of ENaC, inducing changes that activate or inhibit ENaC gating.

"Dan was the first to discover a novel feedback mechanism that allows ENaC to sense and respond to changes in extracellular pH," says Snyder.

"This project illustrates one of Dan's strengths—by paying attention to details and pursuing an unexpected result, he made an important discovery that has had a large impact on our understanding of epithelial sodium transport and blood pressure regulation."

Iowa career

Collier earned his undergraduate and graduate degrees at the University of Iowa and continues at the UI as a postdoctoral research scholar in internal medicine.

At all three stops along his academic journey, Collier has spent time in the Snyder Laboratory. He started washing lab dishes as an undergraduate, then became a research assistant before beginning his Ph.D. work.

"(Working in this lab) is something I really enjoy, and I've stuck with it," Collier says. "Dr. Snyder has always treated me like I'm one step above where I am. For example, while I was a graduate student, he treated me like a postdoc. It's an ideal combination of being supportive when I have questions, but really driving me to figure things out on my own and chase down what I think is interesting."

Collier has published his research as first author in four articles in the Journal of Biological Chemistry. He has also published four collaborative papers.

"Dan is a critical thinker, with a rigorous approach to science," Snyder says. "He is not afraid to do the key experiment to disprove his hypothesis. He loves to present his work, to defend and extend his ideas, and to get feedback from other investigators. It has been tremendously rewarding to watch Dan grow as a scientist."

UI's national winners

The University of Iowa has had five national winners of the Council of Graduate Schools (CGS)/UMI Distinguished Dissertation Award, the nation's most prestigious honor for doctoral dissertations.

1984—David Lasocki

Humanities & Fine Arts, Music

Lasocki is a certified practitioner of Matrix Energetics for Instant Harmony.

1993—Matthew Anderson

Biological Sciences, Physiology

Anderson is associate professor in the Department of Neurology at Harvard University.

1997—Susan Behrends Frank

Humanities & Fine Arts, Art History

Frank is associate curator for research at the Phillips Collection in High Point, NC.

2007—Michael Chasar

Humanities & Fine Arts, English

Chasar is assistant professor of English at Willamette University in Salem, OR.

2008—Jessica Horst

Social Sciences, Psychology

Horst is senior lecturer of psychology at the University of Sussex in England.

Deafness in the

People with hereditary hearing loss must undergo multiple genetic tests for doctors to determine the exact cause. Testing for each possible genetic cause is expensive, time consuming, and often inconclusive.

Using recent advances in DNA sequencing, University of Iowa M.D./Ph.D. student Eliot Shearer has developed a single test that screens for all 70 known deafness-causing genes, making diagnostic testing more cost-effective for patients.

Shearer, who earned his Ph.D. in molecular physiology and biophysics in 2012 and will complete requirements for his M.D. in January 2014, helped design and implement a targeted sequence capture platform called OtoSCOPE®.

He also established an efficient protocol that enables scientists to reproduce gene sequence samples.

Shearer's dissertation, "Deafness in the Genomics Era" has contributed to a paradigm shift in the care of patients with hearing loss.

"In part due to Eliot's research contribution, a comprehensive genetic test like OtoSCOPE® is now commonplace," says Marlan Hansen, M.D., associate professor of otolaryngology (the study of ear, nose, and throat diseases). "This test is now ordered hundreds of times a month to help patients and clinical care providers across Iowa, the United States, and the world."

Shearer won the inaugural Rex Montgomery Dissertation Prize this year. The Graduate College chose Shearer to advance to the national dissertation competition as the UI's nominee in the biological sciences for the Council of Graduate Schools/University Microfilms International Distinguished Dissertation Award.

Testing for multiple genes

Comprehensive clinical genetic testing did not exist when Shearer began graduate study at the University of Iowa in 200. At that time, single-gene testing took three months per gene and cost up to $1,800 per test.

Shearer helped the UI prove the feasibility of comprehensive genetic diagnosis for hearing loss. Shearer and his mentor, Richard Smith, M.D., professor of otolaryngology, led a group of researchers who described the functionality of OtoSCOPE® in a 2010 issue of the Proceedings of the National Academy of Sciences.

This article, which forms the basis of the first chapter of Shearer's dissertation, has been broadly cited by scientists within and outside the deafness field, according to Smith.

"Instead of going one gene at a time, we wanted to sequence all the deafness genes at once," says Shearer, whose research was funded by an NIH F30 Predoctoral Fellowship. "In order to do this we needed to isolate the genes known to cause deafness from the rest of the genome with a method called targeted sequence capture. Before using this method for genetic testing, we first needed to validate the platform to make sure that it was approved for clinical testing. We were the first group in the world to create a targeted capture platform for deafness.

"This was all new, so there wasn't anyone to talk to. That made it more difficult, but also much more fun. We had to make ourselves the experts."

Targeted sequence capture involves sequencing hundreds to thousands of genes using whole-genome sequencing approaches.

Shearer and Smith published two manuscripts in BMC Biotechnology and BMC Genomics describing improvements they had made in the OtoSCOPE® method. These improvements enhance the clinical applicability of OtoSCOPE® by improving efficiency and reproducibility.

OtoSCOPE® enables doctors to project the severity of hearing loss, provide potential genetic counseling, and make a prognosis for additional hearing issues, such as Usher Syndrome and Pendred Syndrome. Usher Syndrome features hearing loss and an eye disorder called retinitis pigmentosa, while Pendred Syndrome is a genetic disorder that causes early hearing loss in children.

Genomics Era

Using OtoSCOPE®, doctors can run a comprehensive genetic test for hearing loss in a single test tube, which increases the efficiency and accuracy of the test. The three-day-long test involves isolating the desired section of the genome, washing away the rest of the genome, and sequencing the remaining genes.

"Eliot utilized cutting edge advances in DNA sequencing to simultaneously screen a large number of known deafness-causing genes," says Michael Anderson, associate professor of molecular physiology and biophysics and member of Shearer's dissertation review committee. "The work required expertise with both molecular and bioinformatic methodologies, a somewhat rare feat for a graduate student to achieve at his level of expertise."

In June 2013, Shearer and Smith published the results of the first 100 patients to receive comprehensive genetic testing for hearing loss using OtoSCOPE® in the Journal of Medical Genetics.

The researchers showed a high success rate in their ability to deliver clinically-significant, comprehensive genetic test results.

Researchers were able to deliver a clear diagnosis in 56 percent of patients with hearing loss caused by recessive genes. The diagnostic rate in the overall population was 44 percent, because fewer dominant genes have been identified as contributors to hearing loss. Other genetic tests show a diagnostic rate of around 16 percent in the overall population.

A clear and complete genetic profile of the cause of hearing loss can help a patient/doctor team understand the likely progression of hearing loss and predict the effectiveness of specific interventions and therapies.

"This paper highlights the paradigm shift genetic testing is undergoing," Smith says. "After a medical history, physical examination, and audiogram, genetic testing should be the next test ordered in the clinical evaluation of a deaf/hard-of-hearing person. It saves health care dollars and is the foundation on which personalized genomic medicine for hearing loss is being built."

Shearer says OtoSCOPE® costs $1,500 per test. The UI hopes to reduce the cost to $500 in the future.

Shearer's super hero

Shearer attributes much of his success as a scientist to his mentor.

"Dr. Smith gives you enough freedom to do what you want, but he will help you when you need help," Shearer says. "He's like a super hero. He does more in a day than anyone could do in a week. The biggest thing I've learned from him is to be kind and caring about everything. He always has the person in mind when we do research.

"The goal of his research is to improve people's lives. He told me when you're doing clinical medicine you can impact people on a day-to-day basis, but doing research and changing science is how you can impact millions of people."

Shearer is preparing to follow in Smith's footsteps, having made significant progress toward establishing a distinguished career as a head and neck surgeon and researcher.

"What started as a curiosity has developed into a full-blown passion for translational science," Smith says. "(Shearer) has learned how he can help patients not only directly through clinical work, but through the far more reaching effects of scientific advancement."

Photo provided by Eliot Shearer.

Women of i

The manuscripts, dating back to the 1500s, live in their original bindings. Given their age, these unspoiled specimens are a lovely find, with words beautifully written in either Latin or Italian on thin material made from calfskin, sheepskin, or goatskin.

These are liturgical, devotional, and theological works hand copied by Italian religious women who played a far more important role in the Renaissance than commonly thought.

For her award-winning dissertation, University of Iowa scholar Melissa Moreton examined over 200 manuscripts. She documented an exhaustive list of manuscripts produced by Italian Renaissance nuns, half of whom lived and worked in Florence, Italy, the birthplace of the Renaissance. Moreton went on to analyze all aspects of these manuscripts to find that these nuns were surprisingly connected to the humanist revival of the arts and scholarship of the time.

"Moreton challenges the scornful portrayal of women by Italian humanists of the time, a picture accepted by most scholars ever since that there was little or no book learning for women except under the most extraordinary circumstances," says Constance Berman, professor of history and Moreton's dissertation advisor. "She shows that these nun-scribes who were producing manuscripts and printed books were well educated in the types of book learning done by priests and humanists alike."

Moreton, who earned her Ph.D. in history in 2013, received the 2013 D.C. Spriestersbach Dissertation Prize in the humanities and fine arts category. Her dissertation is titled, "'Scritto di bellissima lettera': Nuns' Book Production in Fifteenth- and Sixteenth-Century Italy."

The Spriestersbach Prize is named for Duane C. Spriestersbach, who served as Graduate College dean from 1965 to 1989. When the prize was founded over 30 years ago, Spriestersbach hoped it would "serve as tangible evidence—as 'gold standards'—of the outstanding work of which graduate students are capable and to which all others should aspire."

As a Spriestersbach Prize winner, Moreton is this year's UI nominee for the Council of Graduate Schools (CGS)/University Microfilms International (UMI) Distinguished Dissertation Award in the humanities and fine arts. This national award is the most prestigious dissertation prize in the country. Iowa has five national winners, more than any public institution. Thirteen more Iowa nominees have been finalists in the competition.

Educated women of Italy

Nuns are often viewed as cloistered, religious women who are set apart from the rest of society. As a result, their work is often marginalized.

However, after studying these manuscripts, Moreton discovered that history should paint a much different picture of these religious women.

Moreton says secular and religious life was intertwined during the Renaissance, and high dowry fees prevented a father from negotiating marriage agreements for all his daughters. For example, if a father had six daughters, he might be able to pay the dowry for only two, and the remaining four daughters would enter into convent life. Many of these religious women came from elite families. This, says Moreton, dispels the notion that all nuns were too poor to do anything but enter the convent.

"The reality was that—in Florence by the mid-16th century—1 in 19 people was a nun, and there's a good chance she was educated," says Moreton, who received a Ballard and Seashore Dissertation Year Fellowship in 2012-13 and a T. Anne Cleary International Dissertation Research Fellowship in 2008 from the Graduate College. "Within the convent, bookmaking was a way for educated women to express their intellectual and artistic abilities. To produce these books, they had to know Italian, Latin, and Greek. They also had to have a range of scribal and artistic abilities. These were educated women."

Moreton estimates that 60 percent of the

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copied manuscripts were devotional and/or theological texts used for private meditation and study. Moreton found most of these manuscripts in good condition.

"Since these devotional books were not high-end luxury manuscripts with elaborate painting and gilding, they were largely left alone and not cut up or rebound over the centuries," Moreton says. "So, a very high number of these books are still in their original bindings—a rare treasure that provides a wealth of information about books and learning in the period."

THE WORK OF RENAISSANCE NUNS: Manuscripts in Florence, Italy. Photo by Melissa Moreton.

Moreton says that by mining the primary documents related to these religious houses, "you can flesh out the lives of these women and contextualize the work they did."

Jonathan Wilcox agrees. He is professor of English and member of Moreton's dissertation review committee. "The surviving accounts of an early printing press are particularly fascinating. This allows Melissa to unpack the economics of early printing and to point to the complex interaction of printing and hand-copying," he says.. "Melissa is able to uncover some of the structures of power that underlie book production in religious houses, including both cooperation with powerful men—religious or secular—and cases where the production was apparently motivated by the women themselves.

"She arrives at the hard-won conclusions that nun-scribes are generally of very high status, and they collaborated more than one might expect with monks and secular folk."

Impact of her work

Moreton came to the University of Iowa trained as an art historian after earning a master's degree in Italian Renaissance Art History in Florence, Italy, through Syracuse University.

In 2009, Moreton earned a graduate certificate from the internationally-known Center for the Book after producing an analysis and transcription of a late-medieval convent record book from Venice, which is housed in Special Collections at the UI Main Library.

Her work—first at the Center for the Book and later as a Ph.D. student in history in the College of Liberal Arts and Sciences—contributed to the scholarship found in her award-winning dissertation. Her work combines expertise on book production, manuscript studies, and the history of 15th- and 16th-century Italy.

"Moreton has provided a great scholarly tool that will allow future scholars to identify books produced by Italian nuns in a variety of out-of-the-way places throughout Europe and beyond," Berman says. "The census established here in the appendices of all known manuscripts produced by Italian nuns will remain the standard 'go-to' research tool henceforward."

Art & Ecology

For the past century, the Iowa Lakeside Laboratory has allowed scientists to study the ecology of prairies, wetlands, and lakes of the Iowa Great Lakes landscape. In 2012, the Lakeside Lab expanded its academic mission beyond science to include new works of art and community scholarship.

Lisa Johnson, an Iowa-based environmental artist, has taken on the challenge of weaving the arts into the scientific fabric of this 140-acre nature preserve and biological field station, located on the shores of West Okoboji Lake in Milford, Iowa. *—Continued on page 20.*

ARTIST'S STATEMENT: "My work explores our relationships to landscape and to one another. I am particularly interested in the interactions of untold stories, lesser histories, and mythologies that make up our sense of personal and ecological place. My work often asks: What is the space between us? And: What might it take to cross it? Layering sculpture, theatricality, oral tradition, and personal myth, I look to capture the shifting perspective we face as our bodies relate to the spaces we inhabit and those we inhabit them with." —Lisa Johnson Photo by R. Eric Stone.

Continued from page 18

Johnson, who earned an MFA in sculpture at the University of Iowa in 2012, is coordinator of the Artist-in-Residence Program at the Iowa Lakeside Laboratory. In this position, she has been pivotal in establishing LakeEffect LAB—a new collaboration between the Lakeside Lab, the surrounding communities of about 15,000 residents (100,000 in the summer), Iowa artists, and artists from across the United States.

"Many artists are working within a framework called social practice, and I often align with that," Johnson says. "When it's really working, my art engages with the communities where the art is built. Social practice expands the idea of art beyond the walls of the gallery. It allows artists and their communities to address questions they are facing together.

"At Lakeside Lab, artists have created projects built around water quality, noise pollution, and environmental ethics. Those kinds of conversations are more complex than a single sculpture, painting, or print. The artists we're working with are creating dialogues and events alongside more traditional art objects. They're involving the community in their work, hoping to form partnerships that benefit the local ecology."

Ecological art projects

An artist whose work ranges from set design to papermaking, Johnson is building a bridge between the Iowa Lakes community and the world of science.

Johnson, a graduate fellow at the Obermann Institute for Engagement and the Academy in 2012, initially met with lab scientists to discuss their research and ecological concerns, and community groups to gather local histories and narratives. Her projects address ecological concerns of the communities in northwest Iowa.

Her Water for Trade project asks participants to determine the value they would give to a natural resource many claim is priceless—water. Johnson gathered jars of water from Lake Okoboji, and approached boaters to ask what they would trade for a jar of lake water.

"We're all using water and acknowledging that it's important," Johnson says. "How important is it, and by what value system? I was doing a lot of research on the economic value of natural resources, and I kept coming up against things that have a hand in the destruction of ecology, not its preservation.

"For example, the lake shore you can build on is more valuable, on paper, than an area you can only preserve. I wondered what kind of value people would give the water if I asked them, personally, to make a trade. It's a way to start a conversation by asking questions about our resources and how we use them."

Johnson's 2012 MFA exhibition, home.land., mapped personal relationships to the landscape. It included a paper quilt, which was patterned after aerial views of Iowa prairies and farms, based on drawings of one plot of land as it changed over the past 75 years. The exhibition also included listening stations, featuring audio essays about the landscape. The audio was gathered from interviews of community members Johnson conducted.

The home.land. quilt was produced with the help of an environmental action quilting bee in the community. Participants in the bee gathered to sew a paper quilt, discuss ecology, and replant native seeds.

— Continued on page 23

Photo by R. Eric Stone.

My work explores our relationships to landscape and to one another. I look to capture the shifting perspective we face as our bodies relate to the spaces we inhabit and those we inhabit them with.

—Lisa Johnson, 2012 MFA in sculpture

PAPER QUILT: Johnson's 2012 MFA exhibition, home.land., mapped personal relationships to the landscape. It included a paper quilt based on aerial views of Iowa prairies and farms and drawings of one plot of land as it changed over the past 75 years.

Home.land. also included an environmental action quilting bee. Participants in the bee gathered to sew a paper quilt, discuss ecology, and replant native seeds.

Johnson, pictured here with the quilt, says, "Most of us live in the landscape as tourists and don't interact with it substantially or in a conservational way. It's more difficult to talk about what it really takes to restore the landscape and take care of it."

Photos of the home.land. exhibit by Allison Welch.

Detail of home.land. paper quilt.

home.land.

—*Continued from page 20*

Johnson sees parallels between how people treat each other and how people treat the landscape.

"Our actions within the landscape and our actions in our communities have similarity. Abuses to ecology, human injustices, and social inequity are related," Johnson says. "These are acts of looking at the land, or another person, as something separate from you instead of seeing an equal and valuable partner. We need to look deeper and recognize one another's shared interests and the importance of diverse voices."

Connection between art & science

Steve Hendrix, the UI's campus coordinator for the Lakeside Laboratory, views the involvement of Johnson and the artists-in-residence as important to the Lab's work.

"One way to communicate our work is through the arts, which often touches people in a visceral way, very different from the academic lectures by scientists," says Hendrix, UI professor of biology. "The program Lisa is working with us to create helps break down the walls between groups that result from ever-increasing specialization and will, hopefully, return us to Renaissance-like times when scientists were artists and artists were scientists."

Johnson says one of the most important skills she brought to the project was emphasized in the Obermann Graduate Institute: listening. This skill has been important in establishing collaboration between the artists and the scientists at the Lakeside Laboratory.

"I think of art as an act of careful listening," Johnson says. "There's something valuable in the act of listening. It's about our human presence, our response to nature, and our response to each other.

"My hope is that artists, scientists, and the community can work together at Lakeside to address what's valuable to the region. This is something that each group may not be able to do on its own, but in partnership with one another, so much is possible."

Jennifer New, assistant director, Obermann Center for Advanced Studies, contributed to this story.

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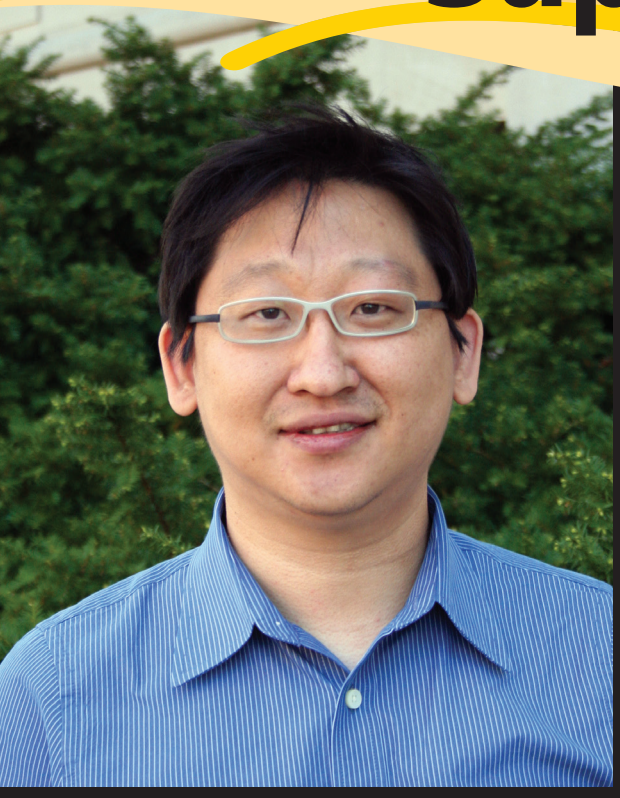

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Daejeong Choi

2012 T. Anne Cleary International Dissertation Fellow
Candidate for the Ph.D. in Management & Organizations

Daejeong Choi examines social and cultural contexts that affect ways in which South Korean leaders and members develop their relationships. His research helps managers understand leadership dynamics in East Asian cultures.

"With support from the T. Anne Cleary Fellowship, I have been able to fly to Korea and get resources necessary to finish my dissertation. Without this financial support, I might not have been able to visit Korean companies to collect data. I had better communications with Korean practitioners, which made the practitioners more interested in the research participation.

"The T. Anne Cleary Fellowship helped me gain connections with Korean companies, increasing my chances for getting a job at several universities."

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