

Lotta Granholm-Bentley, Professor & Executive Director Knoebel Institute for Healthy Aging. Cerulean neurons in the brain stem of a mouse expressing designer receptors which control activity and may significantly enhance memory performance.

Leading the Way with Tau Research

Affecting more than 5 million people in the United States, and increasing, Alzheimer's disease eludes efforts to find a cure. However, there is light on the horizon – a protein named Tau! A pathological hallmark of the disease is the formation of aggregates, or clumps, of a protein named Tau. These aggregates can spread throughout the brain. Once the aggregates encounter healthy proteins, Tau recruits and transforms these healthy proteins into the diseased form. This process occurs with remarkable precision. Associate Professor Martin Margittai and his research team in the Department of Chemistry and Biochemistry seek to understand the basic underpinnings of Tau conversion. When Alzheimer's disease causes cognitive impairment, Tau aggregates are present in expansive regions of the brain, but much less exists in the early stages of the disease. Tau has difficulty crossing the blood-brain barrier making Tau a very rare material in biofluids. Dr. Margittai is attempting to exploit the recruitment and transformation mechanism characteristic of Tau for developing a highly sensitive assay that can detect minute quantities of Tau aggregates in biofluids. The concept is similar to PCR for DNA replication. Future therapeutic interventions will depend on early diagnosis and the Tau amplification assays that are being developed at DU could be an important step in that direction.

FOR MORE INFORMATION

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RESEARCH & SCHOLARSHIP MATTERS

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Publication of the Associate Provost for Research, Corinne Lengsfeld

IN THE NEWS

USA Today- "The Cutting Storyline in '13 Reasons Why' is Scary but True" quotes by Stacey Freedenthal, Associate Professor, GSSW.

Washington Post- "What All the Recent United Airlines Headlines May Mean for Travelers" quotes from David Corsun, Associate Professor, DCB.

USA Today- "Analysis: A Bumpy 100 Days for Trump? Just Wait for the 1,361 to Follow" quotes from Chris Hill, Dean, JKSIS.

7 News—KMGH- "University of Denver Students, Professor Working to Encourage more Women to Enter STEM Fields" interview with Breigh Roszelle, Teaching Assistant Professor, RSECS.

Washington Post- "In Trump's America, Who's Protesting and Why? Here's our March Report" by Erica Chenoweth, Professor, JKSIS, along with colleagues David Prater, Jeremy Pressman, Ches Thurber & Stephen Zunes,

Fox31- "See Violence on Social Media? Say Something" interview with Ian Farrell, Associate Professor, SCOL.

Vice news- "America's Opiod Epidemic is Destroying the Rainforest" quote from Matthew Taylor, Professor, NSM.

NASA Using DU Technology!

Small particles suspended in the air are called aerosols and contribute to air pollution, degradation of visibility, stratospheric ozone depletion and climate change. The University of Denver Aerosol Group, led by Professor Chuck Wilson, has been studying the origins, impacts and fates of atmospheric aerosols for 31 years. The group has developed and deployed on aircraft, instruments and inlets for sampling and measuring particles in the diameter range of 0.004 microns to 15 microns. With support by NASA, NOAA, and the NSF the group's instruments and methods have operated on conventional aircraft, as well as high altitude planes such as NASA's ER-2, WB-57, and Global Hawk. They have made millions of measurements from the surface of the Earth to altitudes of 72,000 feet (22 km) and from the North Pole to the Antarctic Peninsula. The group's first overseas deployments in 1987 were to Darwin Australia and to Punta Arenas, Chile to study stratosphere-troposphere exchange and the Antarctic Ozone Hole. The Aerosol Group had an instrument on the first plane to fly into the Ozone Hole and probed stratospheric ozone in the artic as well. The DU Aerosol Group's measurements and analysis elucidated the critical role of particles in ozone depletion. The group's instruments have also flown in clouds from three volcanic eruptions exposing the mechanism by which volcanic eruptions cool climate. DU Undergraduate and graduate engineering students have contributed significantly to instrument designs that passed stringent flight readiness reviews. DU engineers and technicians have designed and fabricated instruments used by the Aerosol Group and by groups in government labs and other coun-

tries. Professor Wilson seamlessly weaves his research and classes together. From teaching core science classes about the intricacies of climate change to allowing mechanical engineering graduate students the chance to solve challenging, real world problems while also allowing his senior design students an opportunity to design parts to be integrated into air-planes, all students, from non-science majors to PhDs, benefit from this compelling research.



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Law - Making Strides in Wind Energy Research

Law Professor K.K. DuVivier continues her interdisciplinary work as the University of Denver's Principal Investigator (PI) on an NSF award for research on coupled natural and human systems (CNH). Professor DuVivier and her co-PIs, an economist and an atmospheric science professor from the University of Colorado Boulder, are analyzing the legal, economic, and natural science impacts and interactions of wind farms. The team has identified several locations where wind farms sited in close proximity to previously-existing wind farms appear to have impacted the economic productivity of the originally-built farms. Publically-available data on generation find large and statistically significant declines in generation for the first-built sites once neighboring wind farms are installed. Generation at one site appears to have fallen by up to 20%. The observed economic impacts are supported by wind simulation models that measure the predictability of these impacts due to wake effects from one wind farm to the next. The research also examines how wake impacts have been addressed in other countries and compares the laws of the locations studied



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with those of other jurisdictions in terms of lessor protections, royalties, investor expectations, and waste. In 2017, Professor DuVivier's first article to come as a result of this funding was published in Cardoza Law Review, which is ranked as one of the top 25 law journals in the United States. Professor DuVivier presented a poster at the 2016 American Wind Energy Association conference in New Orleans. She and her co-PIs are currently working on a joint article that they hope to publish in a scientific journal.

Developing Tools to Measure Cognitive Function

Karen Riley, Dean of Mogridge College of Education (MCE), working in collaboration with researchers from the University of California at Davis MIND Institute, Rush University, and Northwestern University are forging new roads into developing the necessary tools to measure cognitive development in individuals with intellectual disabilities (ID). Animal studies suggest that substantial gains in cognitive function and even reversal of disability are possible, even in adults with lifelong cognitive deficits. After development and validation of mechanistically-targeted treatments that modify underlying disease processes in animal models, empirically-supported clinical trials to translate these findings to humans with neurodevelopmental disorders (ND) need to be implemented. However, virtually no developmentally appropriate, well-validated and reliable cognitive measures suitable for tracking treatment response are available for individuals with ID. Furthermore, global measures of cognition have profound floor effects and lack sensitivity for lower functioning persons with ID, limiting their use to track cognitive development. As more and more targeted treatments (both pharmacological and behavioral) for ND are developed through the translational cycle, there is a growing urgency for the availability of these cognitive outcome measures. Indeed, it could be argued that lack of timely development of such measures could significantly slow translation of targeted treatments to humans with NDs. This collaborative research project grew out of preliminary studies conducted by Hessel and Kravis, and critically leverages efforts by the NIH Neuroscience Blueprint Toolbox consortium which recently validated a computer administered cognitive battery (NIH Cognitive Battery). The cognitive battery has been piloted, refined and adapted, and is currently being formally validated utilizing groups of individuals with fragile X syndrome with ID (FXS-ID), Down syndrome with ID (DS-ID), and idiopathic ID (I-ID). The proposed research will benefit a wide range of studies aiming to assess or improve specific domains of cognition and general intellectual functioning for individuals with ID. It will also critically extend the

utility of the NIH Toolbox Cognitive Battery (NIH-TCB) into populations of individuals with developmental and intellectual disabilities. At DU the project is being coordinated by Assistant Professor, Jeanine Coleman who supervises a team of 5 graduate students from the Child Family and School Psychology program. The implications of the findings are central to advancing interventions for individuals with ID, but the research study itself is already serving to change the lives of individuals with ID and their families.

FOR MORE INFORMATION



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QUICK FACTS

RECENT MAJOR GRANTS AWARDED

DU received \$109k from invention royalties last year and 1/3 of that went directly back to the inventors

Center for Statistics and Visualization served more than 80 faculty and 200 students providing \$185k in free consulting services to research projects

DU, for the second year in a row, exceeded an all-time high in research expenditures with over \$28M in FY17

Elysia Davis (AHSS) - \$3.3M

Reducing Fetal Exposure to Maternal Depression to Improve Infant Risk Mechanisms, funded by the National Institutes of Health

Aaron Schneider (JKSIS) - \$1.7M

Innovation Policies to Foster Production, Innovation, and Technology, funded by Bahia Research Foundation (Brazilian State)

Wenzhong (David) Gao (RSECS) - \$385K

REU Site: Summer Research Experience for Undergraduates in Micro and Smart Grid, funded by the National Science Foundation

James (Chuck) Wilson (RSECS) - \$339K

High-altitude Aerosol Microphysical Observations: Development and Calibration of an Improved Airborne Measurement Package, funded by Langley Space Flight Center

DU Leads the Way to Inclusiveness

On December 3, 2014, Governor Hickenlooper, with bi-partisan support, issued an official public apology on behalf of the Governor's office and the State of Colorado for the atrocity of the Sand Creek Massacre. In taking this unprecedented action, Governor Hickenlooper specifically recognized and cited the work of a DU faculty group as providing essential information to justify his action, one that acknowledges a responsibility for the past as a means of promoting healing, peace, and justice into the future. The work referred to by the governor is the John Evans Study Report issued on November 1, 2014. A culmination of research by a group of DU faculty in consultation with members of the Arapaho and Cheyenne Nations, as well as historians, the scholarly report has led to a growing awareness of the need for community outreach at DU and the community at large. While the practical impacts of this work may seem distinct from Dr. Billy Stratton's (Associate Professor, AHSS) scholarship in Native American literature, he sees it as "part of a greater whole in which inter- and cross-disciplinary dialogues can be created that give space to the vital expression of Native American perspectives within literary and historical discourses from which they have long been

excluded. Such knowledge can be vital in creating a new awareness of the complexity of history, while promoting positive change in all of our communities." Stratton strives to convey these lessons to the broader world through his writing, as in his latest book, *The Fictions of Stephen Graham Jones: A Critical Companion*, which is the first collection of scholarship on Jones. Jones challenges what constitutes Native American literature and what it means to be a Native American writer. As editor, Billy J. Stratton foregrounds these heavily contested questions and their ongoing relevance to readers and critics alike.



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Open Innovation Alliances in the Pharmaceutical Industry

When it comes to collaboration on research and development (R&D), the pharmaceutical industry isn't known for sharing knowledge among companies. Pharmaceutical companies have traditionally pursued strong intellectual property (IP) rights, typically through guaranteed exclusivity of a drug patent. However, the high cost of developing new drugs combined with declining R&D productivity over the past 20 years have transformed the industry to one that is embracing the notion of open innovation collaboration. In these collaborations, companies are willing to join a consortium to share knowledge with other companies, universities and non-profit organizations in hopes of developing new knowledge, all without IP protection. These collaborations offer the opportunity to explore key research questions around innovation management, appropriability of knowledge and intellectual property, and effective company collaboration. To answer these questions, the National Science Foundation (NSF) funded a three-year project that will offer the first large-scale study of open R&D consortia as a new form of cooperation in the pharmaceutical industry. Working with Joel West, from the Keck Graduate Institute, we are creating a public use database and typology of open R&D consortia based on archival data. Interviews are being conducted to provide detailed case studies and soon we will begin to survey key stakeholders about the attributes, practices and performance of a broader range of consortia. Beyond the research insights, the project will have direct relevance for leaders of consortia and other public-private partnerships, including policy makers. Finally, disseminating best practice for these consortia will help maximize the benefits that pharmaceutical firms gain from such collaborations, accelerating the availability of practices and drugs which will improve health outcomes.



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Changing the Lives of Youth Bridge Project Delivers!

For more than 25 years the Bridge Project, operated by the Graduate School of Social Work, has worked tirelessly with youth and families in Denver's public-housing neighborhoods with amazing success. With 100% high school graduation rates among the participants, The Bridge Project is fulfilling its mission to provide a path for youth in Denver's public housing neighborhoods to graduate from high school and go on to college or a vocation. This success is based on a philosophy of engagement - engaging youth in educational opportunities and facilitating the development of self-sufficiency. Founded in 1991 by the University of Denver and the Graduate School of Social Work, the Bridge Project serves 600 students in kindergarten through college each year. The programs are evidence based and consist of early literacy, STEM, social/emotional and postsecondary readiness. The Bridge Project has expanded across schools at DU, becoming a cross-disciplinary program, furthering the experiences of Bridge students. Working with Daniels College of Business, Ritchie School of Engineering, and the Morgridge College of Education, the Bridge Project is increasing the educational opportunities for these students and preparing them for life after high school, whether they choose to go onto a career or to college. Support for the Bridge Project comes from various private and public funding, such as grants from the Colorado Department of Higher Education, which helps low-income high school participants prepare for college. It is also supported by the City of Denver which sponsors positive youth development

programs for middle school students. Bridge is one of only six organizations in the State of Colorado to receive and complete the Social Innovation Fund (SIF), a multi-year federal grant administered by Mile High United Way, which helped develop and expand evidence based literacy programming for kindergarten through third grade participants. Subsequent comparison group data concluded, that when compared to other children who reside in public housing, those who participate in Bridge experienced increases in reading, math, science, school attendance, and decreases in out of school suspensions.



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ABOUT THE PUBLICATION

Research and Scholarship Matters is a quarterly newsletter produced on behalf of the faculty of the University by the Associate Provost for Research.

Faculty with notable accomplishments or images suitable to the front panel of the next issue are encouraged to send them to Corinne Lengsfeld, Associate Provost for Research. Not all submissions can be included, but every attempt will be made to be inclusive of all high quality research, scholarship and creative works.

For back issues access: www.du.edu/research-scholarship/

WANT MORE INFORMATION?

Want to receive emails regarding resources, celebrations, opportunities, and upcoming deadlines related to research and scholarship? Join the DU-Research list serve by clicking https://listserv.du.edu/mailman/listinfo/du-research and subscribing.



DU IMPACT 2025 Implementation Teams are researching, designing and implementing projects to experiment and innovate in DU's 4 transformative directions: Students Learning and Leading in a Diverse and Global 21st Century; Discovery and Design in an Age of Collaboration; Engagement and Empowerment in Denver and the Rocky Mountain West; and One DU.

Examples of Funded Pilot Projects:

<u>Curricular Innovation:</u> 8 of 26 faculty proposals have been chosen that will help students develop clear ways to connect their curricula, co-curricular activities, and community experiences.

<u>Case Management:</u> Creating case management positions to provide preventative and long term care support for students living with complex social and personal issues who struggle to navigate available resources.

<u>Faculty Fellows:</u> Provides Infrastructure to and resources toward developing a University plan for diversity and inclusion by embedding unit specific faculty positions who will foster engagement in each unit's diversity and inclusion plan. The deans of the 5 participating academic units, in collaboration with ODI, will nominate a faculty member for a two-year funded position.

<u>DU Grand Challenges:</u> A family of programs that will unite university and community change makers to address the most difficult and far-reaching issues facing our society. We have sent a community-wide message soliciting proposed topics. Concurrently, RSECS is implementing the Grand Challenges Scholars Program, endorsed by the National Academy of Engineering, and GSSW is playing a key role in the Grand Challenges for Social Work initiative led by the American Academy of Social Work and Social Welfare. Although similarly named, the initiatives differ in structure, with RSECS and GSSW following national guidelines and DU Grand Challenges, selecting issues based off of the DU community's feedback and resources.

impact.du.edu

Events

Events that showcase DU faculty, staff, and student excellence in research and scholarship

September 20, 2017 CCESL Open House

September 25, 2017 National Research Administrators' Day

October 3, 2017 MCE IRB Workshop
October 4, 2017 GSSW IRB Workshop

November 1, 2017 Faculty Research and Scholarship Breakfast

(orientation for new faculty)

Deadlines

Deadlines for internal funding opportunities intended to support research and scholarship

October 26, 2017 (tentative) FRF Grants

January 13, 2018 (tentative) INTZ Grants