2015

Discovery: Research Annual Report 2015

Office of Vice President for Research

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Research and discovery are at the heart of our mission at the University. It drives performance and content in the classroom, laboratories, and studios. It guides our social responsibility to be part of the solutions facing our region, state, and nation. It defines who we are as a national research institution of higher learning.

This past year was a great one for WMU Discovery. An increase in collaboration and multidisciplinary teamwork led to a sharp increase in the 2014-15 grant totals, $8 million above the previous year.

We have worked to encourage and facilitate large collaborative, multidisciplinary partnerships. Success here has helped to establish Western Michigan University as a leader in flexible electronics, education, autism, and transportation research among others. The expertise and value of our faculty have been nationally recognized. You can see the results of their work here within the pages of the 2015 Discovery Annual Report.

WMU has a long, storied tradition rooted in the idea that each of us can make a difference. Today that difference involves knowledge generation that is spread through education, technology transfer, and commercialization that impacts the national and global environment and makes a difference in the local community and broader region. This year’s report showcases the reach of our research as it helps those here in our community and offers the opportunity to change other regions. The Autism Excellence Center is a good example of how our expertise makes a difference to families here in SW Michigan. But beyond that, we seek to educate and build capacity so that families in need of resources across the nation can be served by our discoveries.

We are a learner-centered, discovery driven, and globally engaged University. We invite you to join us in this commitment to our mission. Together we can make a difference by the discovery work we do daily here at WMU. To learn more about the University and our research endeavors, visit wmich.edu/research.

John M. Dunn, Ed.D.
President

Daniel M. Litynski, PhD
Vice President
Office of the Vice President for Research

“Autists are the ultimate square pegs, and the problem with pounding a square peg into a round hole is not that the hammering is hard work. It’s that you’re destroying the peg.”
Paul Collins, author
Collaboration and teamwork leads to sharp increase in grants

An increase in collaboration and multidisciplinary teamwork has led to a sharp rise in grants to Western Michigan University. Externally funded awards, much of them for research, pushed the grant total for the 2014-15 fiscal year past $35 million, an increase of nearly $8 million over the previous year. The grant total in June, the last month of the University fiscal year, came in at $3.7 million.

The year-end grant total—$39,166,490—is roughly $8 million above the $32,179,910 tallied for fiscal year 2013-14.

“Our office has been encouraging and facilitating large collaborative, multidisciplinary, multi-institutional and multi-national partnerships to successfully receive large grants and to create and support research centers,” says Dr. Daniel Litynski, WMU vice president for research. “WMU’s outstanding faculty can and do compete and collaborate with the best institutions and experts in the nation in our areas of expertise.”

A good example of large collaborative efforts funded during the period is a more than $3.2 million First in the World grant from the U.S. Department of Education to use unique opportunities afforded by the Kalamazoo Promise to build an institutional culture focused on increased access and degree completion for underrepresented, underprepared or low-income students.

The grant, co-directed by Drs. Andrea Beach, professor of higher education leadership, and Dr. Charles Henderson, a professor with a joint appointment in WMU’s Department of Physics and its Mallinson Institute for Science Education, is meant to create and validate through ongoing research, student success programs that can tackle the problem of low rates of degree completion. The goal is to create programs that other universities can adopt, knowing there is sound research data behind the strategies embraced and replicated.

A $4 million award from the Michigan Department of Community Health to boost autism research and training. The grant, awarded to Drs. Stephanie Peterson and R. Wayne Fuqua, chair and professor of psychology, respectively, is being used to establish the WMU Autism Center of Excellence, increase enrollment in behavior analysis training programs and provide more services to children with autism and their families.

Grants of $923,700 and $1.4 million from the U.S. Department of Transportation established and support the Transportation Research Center for Livable Communities in cooperation with four other universities. The project is being carried out by a multidisciplinary team of researchers headed by Dr. Jun-Seok Oh, professor of civil and construction engineering and the grant’s principal investigator, and Dr. Osama Abudayyeh, professor and chair of the Department of Civil and Construction Engineering and associate dean of the College of Engineering and Applied Sciences. Other key colleagues are from civil and construction engineering, blindness and low vision studies, psychology and geography and urban planning, computer science and special education. Those two grants, along with additional grants of $1.4 million and $469,600 will fund the center through September 2018.

A series of grants awarded to CAPE—the University’s Center for the Advancement of Printed Electronics, which has been honored for its groundbreaking work in advancing the field of flexible electronic and printed electronic technologies. Recent work headed by Dr. Massood Atashbar, professor of electrical and computer engineering, and Dr. Margaret Joyce, professor of chemical and paper engineering, was integrated earlier this year into a new center called the Flexible Electronics Applications and Technology—FEAT—Center. This is now a regional and thematic node which is part of a national $171 million Department of Defense manufacturing innovation initiative known as the Flexible Hybrid Electronics Manufacturing Innovation Institute.

Other grants during the period promoting multidisciplinary collaboration and partnership to create and support research centers include:

A $4 million award from the Michigan Department of Community Health to boost autism research and training. The grant, awarded to Drs. Stephanie Peterson and R. Wayne Fuqua, chair and professor of psychology, respectively, is being used to establish the WMU Autism Center of Excellence, increase enrollment in behavior analysis training programs and provide more services to children with autism and their families.
Autism Resource Launched at WMU as part of $4 Million from State of Michigan

Michigan Lt. Gov. Brian Calley and a number of Michigan legislators and state officials were at Western Michigan University this fall to help open a major new resource for Michigan families—Western’s Evaluation Center for Autism and Neurodevelopmental disorders—known as WECAN.

Located in WMU’s Unified Clinics on the University’s Oakland Drive Campus, the new center is part of WMU’s multifaceted Autism Center of Excellence. Families will be able to visit WECAN and work with an interdisciplinary diagnostic team specializing in autism spectrum disorder to have children’s skills assessed along with family needs. They’ll receive a diagnosis along with individualized treatment recommendations, if appropriate. The assessment will be based on high-quality, autism-specific assessment tools, observation, interviews and the team’s clinical expertise.

“Western Michigan University is the best in this field, anywhere in the nation and probably anywhere in the world,” said Calley in his comments as he lauded the University’s work in training professionals and providing services for children and families. “It totally changes the direction of people’s lives...And Kalamazoo is way ahead of the curve in putting together partnerships and expertise together with the local educational system.”

WECAN is one of several elements of the WMU Autism Center of Excellence, which was funded by a special $4 million appropriation by the Michigan Legislature that is administered through the Michigan Department of Health and Human Services. The funding for service and training is designed to increase Michigan’s capacity to train professionals and expand services so that families will not have to wait so long for diagnosis and treatment. WECAN opened for client appointments in mid-September.

WMU AUTISM CENTER OF EXCELLENCE

“WECAN will be equipped to deliver the “gold standard” of diagnostic evaluations and other assessments for children with autism,” says Dr. Stephanie M. Peterson, chair of the psychology department, who with Dr. Wayne Fuqua, professor of psychology, co-directs the Autism Center of Excellence. Peterson says the WECAN will have the advantage of bringing interdisciplinary teams to the evaluation task. Team members will include a licensed psychologist specializing in autism spectrum disorder and behavior analysis, a speech/language pathologist, an occupational therapist and a development pediatrician. A psychiatrist and social worker will also be on the team as needed. Dr. Ann Tyler will direct WECAN.

“WECAN will play a pivotal role in our southwest Michigan community and beyond by assisting both medical and educational professionals to identify the most efficient route to diagnosis for intervention eligibility and benefits,” Tyler says. The WECAN opening is the second major step in recent weeks in the development of WMU as a resource for autism related services. During August, WMU trustees approved the purchase of a new off-campus building to house the Kalamazoo Autism Center. That facility will provide the space needed for an education and treatment program for children diagnosed on the autism spectrum. The center is currently located in a smaller private facility.

Mission

The mission of WECAN is to help accomplish the first of the four goals.

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Initiatives

WMU’s Autism Center of Excellence is an umbrella organization under which a number of initiatives are designed to:

- Support and expand autism assessment and treatment services.
- Expand capacity to train graduate and undergraduate students in applied behavior analysis and other evidence-based educational and therapy approaches to autism.
- Improve the availability and quality of resources and continuing education support services for autism practitioners.
- Expand support services beyond childhood and adolescence to encompass adults and college students who are on the autism spectrum.

WMU AUTISM CENTER OF EXCELLENCE
Faculty receive awards

Emerging Scholar Award

This award acknowledges the accomplishments of WMU faculty members who are among the rising stars in U.S. higher education. It celebrates the contributions of those who are in the first decade of their WMU careers and have achieved national recognition and demonstrated outstanding promise to achieve renown in their continuing work.

Luigi Berto is an associate professor of history. He is a medieval Latin historian who has carved out an international reputation for his body of new scholarship. In the past seven years, he has produced two books of original historical interpretation and scholarly editions and translations of medieval Latin texts, among other scholarly writings.

Berto’s nominators cited him for the remarkable quantity and quality of his research. They also noted that leading authorities praise the rigor of his scholarship and say it is helping to shape his field of study.

Distinguished Faculty Scholar Award

This honor is WMU’s highest award for a faculty member. It recognizes those whose work constitutes a significant body of achievement that is widely recognized within the national and international academic communities.

Chansheng He is a professor of geography who has been a WMU faculty member since 1995. He is an expert in water resource modeling and assessment as well as integration of geographic information system and simulation modeling for watershed management.

Nominators lauded him for his outstanding leadership and tireless efforts in addressing and raising awareness about a wide range of issues related to water resources management. They also praised him for his innovative yet practical research, high level of professional and scholarly activity, and resourceful collaborations.

Technology Development Funds awarded in 2015 provided researchers with support to move their discoveries along the pipeline from invention to commercialization. Three projects received $60,000 in internal support.

Development of a Smartphone-Based, Fully Printed and Flexible/Conformable, Impact Sensing System

Principal Investigator: Dr. Massood Atashbar
Award amount: $20,000

Concussions occurring from head impacts in football have been identified as a major issue for the NFL and the NCAA, governing college football, and for football teams at all levels of play. This project uses printed, flexible, electronic sensors lining the inside of a helmet, along with a circuit to collect data from the sensors, to determine the location and intensity of an impact to the player’s head. The data is sent wirelessly to a computer or cell phone allowing coaches, trainers and parents to track impacts. This data will also allow medical personnel to more accurately diagnose when a player has a concussion. This technology can be applied to other sports and to concussions from explosions and munitions encountered by military personnel.

Use of Tanapoxvirus Recombinant Variants for the Treatment of Breast Cancer

Principal Investigator: Dr. Karim Essani
Award amount: $20,000

The objective of this project is to test the effectiveness of genetically-engineered, human, tanapoxvirus (TPV) for treatment of breast cancer. Several recombinant versions of this virus have been shown to regress human colorectal cancer tumors in a xenograft mouse model. Because these cancer-killing TPV target molecular pathways that are common in most cancers including breast cancer, they will be tested for treatment of human breast cancer tumors that are xenografts in the mammary glands of mice.

Preparation of Conductive, Doped, Nano-Zinc Oxide Ink as a Replacement for Indium Tin Oxide (ITO)

Principal Investigator: Dr. Paul D. Fleming III
Award amount: $20,000

This project focuses on creating an electrically conductive ink that is transparent using aluminum doped zinc oxide (AZO) nanoparticles to replace Indium tin oxide (ITO). ITO is used in photovoltaic cells and other electronics where transparency is required, but it is expensive and is difficult to apply because it has to be spin coated in multiple layers on glass. An ink made from inexpensive AZO not only reduces the cost of materials, but also allows the conductive material to be printed in thick layers in a single processing step.
The creation of a lifesaving medical tool for use in developing nations has resulted in a Western Michigan University student team capturing the top spot in the Collegiate Inventors Competition, a program of the National Inventors Hall of Fame sponsored by the U.S. Patent and Trademark Office and the AbbVie Foundation.

WMU May 2015 alumnus Stephen John and senior Joseph Barnett were named winners of the undergraduate gold medal during an event held Nov. 17 at the patent office’s headquarters in Alexandria, Va. With the win against undergraduate finalists from Columbia, Harvard, Johns Hopkins and Penn State universities as well as the University of Virginia the WMU duo received a $12,500 cash prize.

Barnett and John’s invention, NeoVent, which has now earned five national innovation prizes, is a respiratory support mechanism designed to treat critically ill infants, particularly those who live in developing nations. NeoVent converts a low-tech respiratory device into one that provides the additional benefit of a ventilator, but at much lower cost. The invention could help thousands of babies in underdeveloped parts of the world.

Earlier this year, John and Barnett were named winners of the: Lemelson-MIT National Collegiate Student Prize Competition; Brian Patrick Thomas Entrepreneurial Spirit Award at WMU; 2015 James Dyson Award, U.S. Division; and 2015 Biomedical Engineering Society competition for undergraduate biomedical and bioengineering students.

In October, Barnett traveled to Beijing to attend the Grand Challenges Global Health Summit, an international meeting co-hosted by the Gates Foundation, USAID, and China’s Ministry of Science and Technology, among others. The summit was intended for leaders in global health to collaborate on healthcare solutions for the underserved. Barnett’s trip was sponsored by the Lemelson Foundation, which has partnered with Barnett and John to get their technology to hospitals in the developing world.

The latest competition
Established in 1990, the Collegiate Inventors Competition encourages innovation, entrepreneurship and creativity by recognizing undergraduate and graduate students for breakthrough inventions.

“Each year, these emerging innovators transform their ideas into solutions for real world problems,” says Michelle K. Lee, under secretary of commerce for intellectual property and director of the U.S. Patent and Trademark Office—USPTO. “They are an inspiration to those of us committed to promoting innovation and the value of intellectual property.”

Winners were announced at an awards ceremony hosted by Mo Rocca, CBS Sunday Morning correspondent and host of The Henry Ford’s Innovation Nation. Leading up to the ceremony, finalists showcased their inventions and interacted with thousands of USPTO patent and trademark examiners, sponsors, media and the public at the Collegiate Inventors Competition Expo, held Nov. 16-17.

NeoVent, idea to reality
The invention was developed over the past two years. John and Barnett teamed up to create NeoVent after John learned from a Respiratory Therapists Without Borders official about the need for a low-cost medical device that could deliver biphasic positive airway pressure ventilation to prevent lung collapse in premature babies experiencing respiratory distress in hospitals lacking the costly medical equipment that typically provides this life-saving therapy.

Babies born preterm sometimes have underdeveloped lungs and need some degree of respiratory life support. But, due to expense, ventilation equipment commonly available in developing nations is not always readily available in medical centers in underserved parts of the world. Lessons learned abroad motivated Barnett and John to ensure medical centers in developing countries are well equipped.

Barnett and John were helped by a Research and Creative Activities Award they received from WMU’s Lee Honors College, and they were a part of WMU’s Haworth College of Business student business accelerator, Starting Gate. Starting Gate helped them set goals, develop a business plan, meet regularly with mentors, attend workshops and pitch to investors.

Meet the team
Stephen John grew up in Nepal and returns every summer to volunteer at the United Mission Hospital in Tansen. In Nepal, he helped repair medical equipment in a biomedical department and worked on clinical trials of NeoVent. In May, he graduated summa cum laude from WMU with two undergraduate degrees—one in biomedical studies and another in mechanical engineering. He began medical school at the University of Michigan this fall.

Joseph Barnett started working with students in Honduras after hearing of a shortage of teachers there. He has been to Honduras six times in the past five years, where he has driven school buses, led clothing donation efforts and volunteered in a local hospital, also fixing medical equipment. He plans to volunteer as a teacher in Honduras for one year before attending medical school.

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**UNDERGRADUATE RESEARCH EXCELLENCE AWARD RECIPIENTS, 2014-15**

The Graduate Student Research Fund and Travel Grant, fully funded and administered by the Graduate College, supports graduate students engaged in independent scholarly research, scientific inquiry, inventive technology and original artistic activity. The fund is intended to help students pay extraordinary or unusual costs incurred in research projects. Grants range up to $1,000 and students may apply for up to $500 of additional support to defray the cost of international travel.

**Perovskite Materials Solar Cells Based on Copper**

**Dr. Muralidhar Ghantasala**
Mechanical Engineering

**Characteristics of State of the Recovery System Using Thermo-electric Technology**

**Dr. Pnina Ari-Gur**
Aerospace Engineering

**The Undergraduate Research Excellence Award provides undergraduates with research experience.**

**Hydroxyl and Thiol Groups Protection of Heterocyclic Amino,**

**Green, High-Yield Method for the Biochemistry**

**Jawor, Mia**
Biochemistry

**Hydroxyl and Thiol Groups Protection of Heterocyclic Amino,**

**Green, High-Yield Method for the Biochemistry**

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Biochemistry

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Biochemistry

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**Green, High-Yield Method for the Biochemistry**

**Jawor, Mia**
Biochemistry
Mohammed, Hossein
Mechanical and Aerospace Engineering
Yazd
Micro-Laser Assisted Single Point Diamond Turning On Single-Crystal Silicon

Newhouse, Nicoly K.
Psychology
Yazd
Effects of Valence-Level Induction Training on Functional Speech Acquisition During Picture Exchange Communication System (Pecs) Training

Petrovic, Vasilije
Mathematics
Yazd
Linearizations of multi-polynomials in non-standard bases

*Pilars, Clayton B.
Anthropology
Yazd
A Comparison ofundistics, Extant Species to Understand the Fundamental, Morphology, and Paleontological Phylogenetics (from Primates)

Rahebkarid, Sepideh
Chemistry
Yazd
Multinuclear Tenhun Mass Spectrometry of Reduction of Reduction Efficiency

Sasso, Andrew L.
Genetics
Research
Genetical and Pathological Characteristics of Prevalence in Marengo County, Illinois

Sellers, David L.
Chemistry
Yazd
Application of 1,1,1-Trifluoro-2,2-diaryl-1H-3,1-benzodiazepin-5-one Aromatic Derivatives as Sensors for Nerve Agents

Shi, Yuanning
Chemistry
Yazd
Identification, Weight of Evidence, and Palynology of Betel

*Stigle, Rebecca E.
English
Traverse City
Far From Dark With Us: Women, Childhood, and Power in Old Norse Literature

Sullivan, Jessica R.
Sociology
Research
A Recipe for Success in the English Mode: An Investigation of the Ex-Perience in Mainstream Society

Szczyczy, David T.
Physics Science
Research
Inter-university Communication for Physics and Social Research (ICPSR)—Testing in a Knowledge-Based Methods

Trimpke, Darcy M.
Biological Sciences
Research
Cell Growth in the Sarcoid System of Adult Zalebark

Ukman, Fehime
Industrial and Manufacturing Engineering
Research
Objectively Determining the Language-Related Communication Challenges Between Public and EU (The Traffic Condition)

*Vallentin, Aimone J.
English
Traverse City
She Lived Between Your Female Choices: Female Two-Sex Prison to Public in a Single Bound

Vantosset, Jason D.
English
Traverse City
From Beyond to Beyond: The Wilderness and Nearly Real Ship to Jack Garner: Robert Bieden

Varnell, Joshua M.
Political Science
Research
Speaking about the Annual Literature from the Seneca Discussion in Federal Court Cases

Waldmey, Christopher A.
Psychology
Traverse City
Measuring Counterpoints Among Quality of Life Variables in Older Adults in an Assisted Living Facility

Weidman, Kathryn E.
Counseling Science
Research
Exploring Interpersonal Variables in Supervision: The Role of Supervisor-Authority, Supervisory Style, and Supervisor-Attachment

Williams, Anjo E.
Biological Sciences
Research
Biocatalysis Nitrogenase Gene Clones Libraries from Oil-contaminated Soils

Yahamed, Azem K.
Chemical and Paper Engineering
Research
Three Dimensional Printing in Medical Applications

SUPPORT FOR FACULTY SCHOLARS AWARD IN 2014-15

Akanmu, Abdul
Civil and Construction Engineering
Research
A Sustainable Approach to Building Design

Ackersemb, Kelly
School of Nursing
A Genetical Theory Approach to Understanding Parental Decision Not To Vaccinate Their Children

Bajrak, Bruce
Biological Sciences
Herpes Simplex Virulence in Cancer of the Cancer Cell Culture Line

Berto, Luigi Andrea
History
Living in the Midst of the Mind in the Early Civilians and American Practices of Basic: Between From Now and the Early Middle Ages

Coen, Lisa
School of Music
Performance Environments and Composition in Conference Percussion Duo

Critzer, Ryan
Sociology
Performance and Auditory Evaluation of False Trial Scoring: Protocol for Use in Auditory Hearing Choice

Davis, Jon
Mathematics
Factors Influencing Prospective Secondary Teachers’ Use of Technology

Gu, Chien-Ish
Sociology
From Religious Belief to Secular: Morally Reasonable Religious in South Carolina, 188

Haddone, Sally
History
Late Imperialism of Revolutionary America

Hansford, Claudia
Mechanical and Aerospace Engineering
Research
Build Trajectory in Understanding Four Plans

Hague, Matthew
Special Education and Literacy Studies
Enhancing Specific Reasoning: Influencing Teacher Focus of Implementation with Blended Learning Ocular Behavior

Hopfe, Science of Light
Chemistry
Examining the Requirement for Quaker in the Molecular Perspective

Leenem, Kristen
Biological Sciences
Research
In Situ Erosion of Hall Thrusters

Malcolm, Stephen
Chemical Science
Research
Comparison of Chemical Differences in Three Species of Microorganisms

Mezent, Gelett
Chemistry
Gone, High Field Method for the Production of Hydrogen Anions, Hydron and Fourth Groups

Nasccany, Michael
Anthropology
Research
The Archeology of the North American For Trade: Final Preparations

Osting, Laurel
Dance
Movement: Diving the Michigan Shy Plunge to Each Movement

Perkins, Alisa
Comparative Religion
Working with Number and Interfaith Expressions of Islam in Metro Detroit

Pietras, Cynthia
Psychology
Research
Dysfunctional Effects of Alcohol in Navajo Behavior

Posciak, Maria
School of Social Work
Dissertation and Development of a Research Design for an Evaluation of an Intervention in Southeast Michigan for Young Parents

Ryan, Michael
Economics
National Forecasts and United States Regional Economic Growth

Stayer, Megan
Dance
Dance

Thakurta, Jayashish
Sociology
Final and Paleontological Investigation of the Precambrian Volcanic Belt in Northern Wisconsin

Vilhulbe Ezechverria, Patricia
History
Science of Art Museum
Abdulaziz, Said M. Chemical and Paper Engineering
Abdulyasit, Osmano
College of Arts and Sciences
Chemical and Paper Engineering
$1,042,450
31.11%

Bennett, David Clark
Provost and Vice President for Academic Affairs
$1,218,487
12.06%

Bensley, Robert J.
Bennett, David Clark
$11,642,290
100%

Bensley, Robert J.
Bennett, David Clark
Provost and Vice President for Academic Affairs
$8,124,141
66.23%

Bensley, Robert J.
Bennett, David Clark
State of Michigan
$5,545,476
67.78%

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$5,545,476
67.78%
FACULTY RESEARCH AND CREATIVE ACTIVITIES AWARD 2015 RECIPIENTS

Abdel-Qader, Ikhlas
Electrical and Computer Engineering
A Hybrid Authentication Framework Using Water and Fingers
Positioning System for the Visually Impaired
$10,000

Berto, Luigi Andrea
History
Birthplaces of Dangerous Neighbors: Constructing and Remembering the Identity of the City-State of Naples (750-900)
$9,992

Ciccantell, Paul
Sociology
Culinary and Multicultural Food in British Columbia and West Virginia
$8,761

Hannen, Nicholas
Human Performance and Health Education
Now You're Seeing Fun: The Effect of Exercise on the Subjective Experience of Pain
$9,959

Kane, Donald
Biological Sciences
An Analysis of Cell Cycle Control in the Nematode Caenorhabditis elegans
$10,000

Little, Adriane
School of Art
Virginia Woolf Was Here: Constructing and Remembering the Identity of the Vicars' Field
$8,748

Liu, Tanxiao
Mechanical and Aerospace Engineering
Wind Generator for Power Generation
$10,000

Mattison, Andrew
School of Music
Creating a Recording of “The Moon-Kissed Moon”
$9,298

Ross, Denise
Human Performance and Health Education
Fun: The Effect of Exercise on the Subjective Experience of Pain
$10,000

Wilson, Patrick
Frohlt, School of Art
The Effect of Urbanization on Avian Microbiomes
$9,990

Deepak, Krishna
Anthropology
Learning to Be Bilingual in a Dual Language Elementary School
$10,000

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Daniel M. Litynski
Vice President for Research
(269) 387-8283
daniel.litynski@wmich.edu

Paula Rohler
Associate Vice President for Research
(269) 387-8283
paula.rohler@wmich.edu

While every effort has been made for accuracy, there is still the possibility for errors or omissions. We apologize for any that might occur. Please contact us with any corrections for our next issue.

Editor
Diana Rehs/earl Hart
wmich.edu/research

Assistant Editor
Debbie Hands-Knops
wmich.edu/research

Designer
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