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Contents

Letter from the Department Head................................................................. 1
Mission Statement....................................................................................... 2
University & Departmental News.............................................................. 2
Graduate Courses....................................................................................... 3
Professional Courses................................................................................... 3
American Chemical Society Journals......................................................... 4
Faculty & Staff Recognition: Awards, Promotions, & Service.................... 4
Faculty & Staff Recognition: In the News................................................... 7
Research Activities..................................................................................... 9
Research Activities: Labs of the ITDD......................................................... 17
Student Recognition.................................................................................. 20
MIKI Meeting 2018.................................................................................. 22
Degrees Awarded....................................................................................... 23
Seminars..................................................................................................... 25
Research Grants......................................................................................... 29
Ways to Give............................................................................................. 31
Faculty....................................................................................................... 31
Adjunct Faculty........................................................................................ 32
Administrative Staff.................................................................................. 33
Research Staff........................................................................................... 33
Postdocs, Fellows, & Visiting Scholars....................................................... 34
Graduate Students..................................................................................... 35
Undergraduate Research Assistants & Summer Scholars.......................... 37
Publications Featuring Faculty & Staff (from Pg. 7)................................... 38
Publications By Faculty & Staff................................................................. 40
Letter from the Department Head

As I have done in previous reports, I want you to share with you some highlights of the year 2018.

Several of our faculty members received special recognition this year. I was named Regents Professor, the first for the College of Pharmacy. Regents Professorship is the highest honor the University of Minnesota bestows on its faculty. It recognizes faculty who have made exceptional contributions to the University through teaching, research, scholarship, or creative work, and contributions to the public good. Professor Natalia Tretyakova was selected as a Distinguished McKnight Professor. This is given to honor and reward the U's most distinguished and highest-achieving mid-career faculty who have recently attained full professor status. In addition, Dr. Tretyakova was elected a Fellow of the American Association for the Advancement of Science. Professor Robert Turesky was named to the Endowed Masonic Cancer Center Chair in Cancer Causation. Professor Courtney Aldrich was promoted to full professor. Drs. Kathryn Nelson, Mark Ericson, Jingshu Guo, and Byeong Hwa Yun were named Research Assistant Professors in the Department.

This past year we had a record 60 graduate students enrolled in our graduate program. We were very pleased that 11 of our students obtained prestigious fellowships to support their graduate studies. We also welcomed 32 undergraduate research assistants and summer scholars into our laboratories. Our Department employed 36 postdoctoral and research associates and 35 research staff members this year. Dr. Leigh Allen, Assistant to the Department Head, and Andrew Goode, Assistant Scientist in the Gurvich laboratory both won the Meritorious Service Awards from the College of Pharmacy for their excellent work for the Department.

The Department of Medicinal Chemistry and the Institute for Therapeutics Discovery and Development jointly received a record $12 million in research support from external agencies in fiscal year 2018. The output of research results in terms of publications, conference papers and invited lectures was again impressive.

The Department continues to have a vibrant seminar program that involves many named lectures by leaders in the field as well as student presentations. In addition, our faculty lead additional University-wide seminar series in Chemical Biology (Carston Rick Wagner) and Epigenetics (Natalia Tretyakova).

I am grateful to our faculty, students, postdocs, scientific staff and administrative staff who create an inspiring and stimulating environment for research, teaching and learning. I look forward to the future and I am confident that we will continue to build the Department based on the successes that we have achieved over the years.

Gunda I. Georg, Department Head
Graduate Courses

Graduate courses taught by Medicinal Chemistry faculty in 2018:

- General Principles of Medicinal Chemistry II (MedC 8002)
- Physical and Mechanistic Organic Chemistry (MedC 8050)
- The Chemistry and Biology of Infectious Diseases (MedC 8070)
- Medicinal Chemistry Seminar (MedC 8100)
- BioAssays (MedC 8435)
- Design of Cancer Immunotherapeutics (MedC 8461)

Professional Courses

Professional courses taught by Medicinal Chemistry faculty in 2018:

- Therapeutics of Herbal and Other Natural Medicinals (Phar 5270)
- Medicinal Chemistry Seminar (Phar 6150)
- Pharmacogenomics (Phar 6224)
- Becoming a Pharmacist (Phar 6700)
- Integrated Biochemical Sciences (Phar 6702)
- Pharmaceutical Care Skills Lab I (Phar 6710)
- Applied Pharmaceutical Care (Phar 6716)
- Pharmaceutical Care Skills Lab II (Phar 6720)
- Principles of Medicinal Chemistry (Phar 6722)
- Immune System and Infectious Disease (Phar 6724)
- Principles of Pharmacology (Phar 6726)
- Medicinal Chemistry and Pharmacology of Cardiovascular Agents (Phar 6732)
- Cellular Metabolism and Nutrition (Phar 6734)
- Integrated Endocrinology (Phar 6752)
- Diabetes and Metabolic Syndrome (Phar 6754)
- Medicinal Chemistry and Neuropharmacology (Phar 6762)
- Biotechnology Derived Drugs (Phar 6766)
- Infectious Disease (Phar 6768)
- Integrated Oncology (Phar 6784)
- Being a Pharmacist (Phar 6799)
- Drugs of Abuse (Phar 6908)
American Chemical Society Journals

The American Chemical Society (ACS) Journal of Medicinal Chemistry is the most-cited journal in medicinal chemistry and ranked as the top primary research journal in impact in its category. Dr. Gunda Georg is co-Editor-in-Chief with Dr. Shaomeng Wang at the University of Michigan Comprehensive Cancer Center. Dr. Carrie Haskell-Luevano also serves as Associate Editor. The Journal office is located in the University of Minnesota's 717 Delaware Building.

Dr. Courtney Aldrich serves as Editor-in-Chief of ACS Infectious Diseases. Founded in 2015, the journal highlights the role of chemistry in the multidisciplinary field of infectious disease and published its 48th issue at the end of 2018.

Dr. Carston R. Wagner served as the Executive Editor of Molecular Pharmaceutics, which explores the molecular mechanistic understanding of drug delivery and drug delivery systems. Dr. Wagner served on its editorial board for over a decade before stepping down from the position this year.

The Philip S. Portoghese Journal of Medicinal Chemistry/Division of Medicinal Chemistry Joint Lectureship was awarded this year to Dr. Mark Cushman who is Distinguished Professor of Medicinal Chemistry at Purdue University. The Lectureship is granted each year to individuals who have had a significant impact on medicinal chemistry research.

Faculty & Staff Recognition: Awards, Promotions, & Service

Dr. Gunda Georg was appointed a Regents Professor of the University of Minnesota in June. The Regents Professorship is the highest honor the University bestows on its faculty and recognizes individuals who have made exceptional contributions to the University through teaching, research, scholarship, and contributions to the public good.

“It is an honor to be part of the Regents Professors group,” Dr. Georg responded. “I am very grateful that Dean Welage, Dean Emeritus Speedie, Associate Dean El-Fakahany, my University of Minnesota colleagues, and my peers in other institutions supported my nomination. I owe a great deal of gratitude to the members of my research group, my department, and the Institute for Therapeutics Discovery and Development for their support.”

Dr. Courtney Aldrich was promoted to full professor in May.

Drs. Kathryn Nelson (Principal Scientist, Walters Lab) and Byeong Hwa Yun (Research Associate, Turessky Lab) were both promoted to Research Assistant Professor.

Drs. Mark Ericson (Haskell-Luevano Lab) and Jingshu Guo (Turessky Lab) were both promoted to Research Assistant Professor after completing their postdoctoral research at the University.

Dr. David Ferguson was selected as Professor of Fall Semester 2018 by the class of 2022. This marks the seventh year in a row he has been selected for the honor.

Dr. Natalia Tret'yakova was selected as a 2018 Distinguished McKnight University Professor. The McKnight professorship honors and rewards the University of Minnesota’s most distinguished and highest-achieving mid-career faculty who have recently attained full professor status — particularly those who have made significant advances in their careers at the University of Minnesota, whose work and reputation are identified with the University, and whose accomplishments have brought great renown and prestige to the University of Minnesota.

Dr. Tret’yakova was also named a Fellow of the American Association for the Advancement of Science (AAAS) in November. The honor is bestowed upon AAAS members by their peers and recognizes efforts on behalf of the advancement of science or its applications that are scientifically or socially distinguished. Dr. Tret’yakova was elected in the Section on Pharmaceutical Sciences for distinguished contributions to the field of chemical carcinogenesis and chemical biology. She joins six other AAAS Fellows from the Department of Medicinal Chemistry. Drs. Gunda Georg, Patrick Hanna, Rodney Johnson, Philip Portoghese, W. Thomas Shier, and Carston R. Wagner. She will be formally announced as an AAAS Fellow in February during the 2019 AAAS Annual Meeting in Washington, D.C.

Dr. Natalia Tret’yakova was also elected as Chair-Elect for the American Chemical Society’s Division of Chemical Toxicology. As Chair-Elect, Dr. Tret’yakova will be responsible for aiding the Chair in running the Division of Chemical Toxicology for a period of two years (2019-2020) before assuming the role of Chair for another two years (2021-2022).
Dr. Leigh Allen (Assistant to the Department Head) and Andrew Goode (Assistant Scientist, Gurvich Lab) both won Meritorious Service Awards for their dedication and service to the Department, awarded by the College of Pharmacy at the 16th Annual Employee Day in June. This year’s event featured a tour of the Minnesota State Capitol building in St. Paul.

Dr. Earl Dunham retired in July. Dr. Dunham focused his research on the biosynthesis and pharmacology of endogenous vasoactive mediators and their role in hemodynamics and hypertension. After obtaining his Ph.D. from the University of Minnesota in 1971 he worked as an instructor in the School of Medicine coordinating and teaching pharmacology classes. He joined the Medicinal Chemistry department as an Associate Professor in 1982 where he played a pivotal role in the integration of medicinal chemistry, pharmacognosy, and pharmacology courses for the graduate program.

Dr. Carrie Haskell-Luevano was appointed to serve on the Institute for Translational Neuroscience Steering Committee, which brings together neuroscience leaders from different departments and centers at the University of Minnesota. The Steering Committee is tasked with utilizing breakthrough neuro-related research to develop processes for improving clinical care and new treatments and therapies across the health sciences at the University.

Dr. Robert Turesky was appointed as the Masonic Cancer Center Chair in Cancer Causation. “The way chemicals in our food and environment interact with our tissues has implications for our health,” said Douglas Yee, MD, Director of the Masonic Cancer Center. “Dr. Turesky’s work demonstrating the way certain chemicals could cause cancer will lead to new strategies to detect these substances and minimize human exposure to them to prevent cancers.”

Dr. William Pomerantz was awarded the McKnight Presidential Fellowship, a program targeted at exceptional mid-career faculty to recognize their accomplishments and support their ongoing research and scholarship. The Fellowship is awarded to only five University professors annually.

**Faculty & Staff Recognition: In the News**

Dr. Gunda Georg’s lab received extensive press coverage this year for its insights into the promising potential of the plant extract ouabain as a male contraceptive agent. Ouabain has long been used by African hunters as the lethal agent for poison-tipped arrows, but in small doses it has also shown efficacy in lowering fertility rates in males. By creating a modified version of ouabain that only inhibits sperm motility, the Institute for Therapeutics Discovery and Development group, including Drs. Jon Hawkinson, Kwon Ho Hong, and Shameem Sultana Syeda, was able to achieve infertility in live rats. This research was highlighted in the following articles:

- The Conversation, “Promising Male Birth Control Has its Origins in an Arrow Poison.”
- The Gulfordian, “New Birth Control Pill is Now Available for Men.”
- Futurism, “The Future of Male Birth Control: A 2,000 Year Old Poison?”
- MNDaily, “Heart-stopping Poison Could Be a Promising Male Birth Control, UMN Study Shows.”
- Newsweek, “Male Birth Control Pill Could Be Made From the Heart-stopping Poison in Ancient African Arrows.”
- Gizmodo, “A Toxic Plant Might Help Us Find a Legit Male Birth Control Drug.”
- Smithsonian Magazine, “Heart-stopping Arrow Poison Could Be the Key to Male Birth Control.”
- International Business Times, “Sperm-Slowing Male Birth Control Created From Poison.”
- in-PharmaTechnologist, “Researchers Target African Arrow Poison for Male Birth Control.”
- Science Daily, “Prospective Birth Control Pill for Men Has Its Origin in an Arrow Poison.”
- The Daily Caller, “Fatal Tribal Poison May Be the New Birth Control for Men.”
- Star Tribune, “University of Minnesota Scientists May Have Discovered a Male Birth Control Pill.”
- KAIT News, “Deadly Plant Extract Key to Future of Male Birth Control Pill.”
- 12 News, “Could There Soon Be a Male Contraceptive?”
- KVOA News, “University of Minnesota Continue Their Work on a Male Birth-control Pill.”
- WNYT News, “Scientists Make Headway with Male Contraceptive.”
- BEME, “The Poison Behind Male Birth Control.”

Dr. David Ferguson was consulted for several articles discussing possible theories for how the non-steroidal agent ostarine, which can mimic the effects of testosterone, could have lingered in an athlete’s tissue during later drug testing. He is quoted in the Arizona Daily Star article “Arizona Wildcats Star Allonzo Trier Faces ‘Uphill Battle’ in Eligibility Fight, Drug Experts Say” and in the Yahoo! Sports article “Experts: Allonzo Trier’s Explanation for Latest Failed Drug Test ‘Highly Unlikely.”

Dr. Ferguson also weighed in on the increase of overdoses from K2—a synthetic cannabinoid—in Hennepin county in an article published by City Pages, “Synthetic Weed is Turning Minneapolis Users into Violent Zombies.” As Dr. Ferguson explains, part of the issue arises from the ease with which K2 can be manufactured by opportunistic drug dealers without fully understanding the drug’s toxicity.
Dr. Robert Turesky was quoted in a Bloomberg article, “Impossible Foods’ Quest to Save the Planet Fails to Impress FDA.” The article highlights questions raised about the potential health impacts of the increasingly-popular Impossible Burger, which is made using plant-derived heme. Heme is the component in hemoglobin that gives blood its red pigment and gives the Impossible Burger its close resemblance to beef. However, as Turesky explains in the article, “the heme molecule is also involved in another controversy. Studies have shown that steak lovers are at risk of colon cancer while chicken breast junkies aren’t. Heme makes red meat red, so some researchers think it could be a culprit.”

Dr. Courtney Aldrich’s coauthored work, “Targeting Protein Biotinylation Enhances Tuberculosis Chemotherapy,” was featured in a blog post by the National Institutes of Health. In the post, NIAID-Funded Researchers Probe Potential TB Weaknesses, the National Institute of Allergy and Infectious Diseases concludes “The researchers have developed an unusually-nuanced view of how BPL (biotin protein ligase) helps Mtb survive, which may provide insight into how to proceed to come up with new drug molecules that have the same activity as Bio-AMS (a BPL inhibitor).”

Dr. Carston R. Wagner was featured in the Minnesota Daily article “UMN Researchers Attacking Cancer Cells with Nanotechnology” and in the University of Minnesota’s Research Brief article “Extirpating Cancer with Immune Cells Armed with Nanorings” discussing his team’s work into the development of techniques to activate the body’s immune cells against tumor cells. The lab successfully designed protein-based nanorings to bind to T-cells. The T-cells were then able to quickly destroy any cancer cells they came across when tested in vitro, without the need for genetic engineering. The lab is taking steps towards clinical trials for the therapy, in discussion with the U.S. Food and Drug Administration.

Dr. Rebecca Cuellar was interviewed for the Chemical & Engineering News Halloween article “Chemists Share Their Lab Superstitions” instituting a three-strikes you’re out rule:

Rebecca Cuellar: Broken glassware is an immediate strike; there’s no question on that one. If you spilled something that’s valuable, that’s another strike. Now, if you have something a little bit more major—say you broke a column and not just a disposable test tube—that’s going to probably get you two or three strikes immediately. Towards the end of my graduate school time, I spilled a couple of column fractions that had very important, I don’t remember if they were penultimate compounds, but fairly close to the end of my total synthesis. And so there were cotton ball benchtop extractions that were involved to recover from that.

Keri: Is that a technical process, the cotton ball benchtop extraction?

Rebecca Cuellar: Highly technical, cotton balls sopping up the liquid. Perhaps there are tears mixed in with the solvent and then rinsing them in a funnel. If that was a first strike, I’m going to go ahead and call 2 and 3 right on top of that and, yeah, take a break.

Dr. Alfred Finzel’s lab is conducting research on antagonists of CD44 receptors, which appear on the surfaces of cancer cells and promote metastasis and tumor growth. By interfering with interactions at the cellular level, these novel antagonists have the possibility of application in the treatment of chronic inflammation, cardiovascular disease, and cancer.
Research in Dr. Sunil David’s lab focuses on the discovery and development of endotoxin-sequestering molecules as potential anti-sepsis agents, modulation of innate immune pathways, and host responses to infectious agents. Currently the lab is working toward discovering new adjuvant compounds that would modify the body’s immune response to the Zika virus. Potential adjuvant candidates identified in this study, when added to a Zika vaccine, may stimulate human cells to fight against the virus.

Dr. Mark Distefano’s lab is studying protein prenylation, a modification process in eukaryotic cells that controls the activity of a range of proteins and is essential for processes like cell division and the differentiation and development of stem cells. By gaining further insight into the role and function of protein prenylation, the lab is able to devise new approaches to the development of therapeutic drugs for cancer, infectious diseases, or Alzheimer’s disease.

Dr. Carrie Haskell-Luevano’s lab is studying agonist and antagonist ligands of the melanocortin pathway - a group of peptide hormones involved in the regulation of satiety, obesity, and energy homeostasis in humans. By understanding how such ligands interact with melanocortin receptors, the lab aims to challenge existing paradigms for ligand design and provide new tools for the development of therapeutics to combat obesity and type II diabetes.

Dr. Elizabeth Ambrose’s lab has developed new, small molecules that inhibit the anthrax toxin lethal factor—a secretion from the bacilli that is responsible for anthrax-related mortality. These compounds show promise as anti-bioterror therapeutics that can be used at any stage of anthrax infection. Dr. Ambrose is also working on other anti-terrorism and homeland security-related projects including designing antidotes for the ricin toxin, and engineering enzymes as rapid decontamination solutions against organophosphate nerve agents. Additionally, working in the novel area of geopharmaceuticals, the Ambrose lab has identified key bioactive compounds in Baltic amber for their effects on inflammation, infection, and pain-related pathways.

Dr. Erin Carlson’s lab is working to detect, interrupt, and exploit the master regulators of bacterial growth and communication for the identification of new antibiotics. Their research includes the use of mass spectrometry, informatics, and novel separation reagents to explore and interpret the molecular language used by bacteria to respond to environmental cues; the generation of chemical probes and inhibitors for the global profiling and inhibition of histidine kinases - a ubiquitous class of proteins essential for signal transduction in bacteria; exploring multi-protein systems that dictate bacterial growth and division in order to design selective probes for imaging and proteomics with specific focus on the penicillin-binding proteins; and exploring the molecular-level interactions between organisms and nanoparticles to guide the development of environmentally benign nanotechnology.

Dr. Thomas Hoye’s lab is studying the hexadehydro-Diels-Alder reaction - a novel method for generating highly reactive benzynes. These benzynes can be trapped to create a variety of polycyclic aromatic compounds, which have a number of applications including use in organic light emitting diodes, field-effect transistors, and photovoltaic cells. Alternatively, they can be captured to produce multi heterocyclic compounds having unprecedented structural motifs. Additional activities include the synthesis of sustainable polymers from biorenewable natural products (NPs); NP structure determinations, including lamprey pheromonal compounds; the spontaneous biosynthesis of cytotoxic NPs; and targeted nanoparticle delivery of antitumor agents to cancer stem cells.
Dr. Todd Doran’s lab has continued to grow, accelerating their progress towards understanding the complex biology of neurodegenerative diseases such as Alzheimer’s and Parkinson’s diseases. The Doran lab is developing novel drug leads that slow or stop these chronic conditions. To do this, they are using synthetic organic chemistry to design tools that perturb oxidative stress pathways, protein homeostasis, and neuroimmune pathways during aging. They hypothesize that these mechanisms contribute to neurodegeneration, so understanding this biochemistry will help lead to the discovery of new targets and eventual development of effective drug compounds. They are also using their chemical tools to develop diagnostic assays capable of predicting Alzheimer’s and Parkinson’s diseases at pre-symptomatic phases of neurodegeneration to allow treatment at the earliest stages, when therapy will be most effective.

Dr. David Ferguson’s lab focuses on the application of chemistry to solve problems related to biomolecular structure, function, and activity, especially as it relates to drug design and discovery. His lab pioneered the development of structure-based models for opioid ligand design, described novel catalytic inhibitors of topoisomerase II for use in cancer treatments, and advanced the design of TLR2/8 immunostimulatory agents with cytokine specific attenuation in generating a robust immune response for the design of adjuvants.
Dr. Eyup Akgun and Mary Lunzer, researchers in Dr. Philip Portoghese’s lab, continued their research on the development of MMG22 for the treatment of chronic pain without tolerance or dependence. They are collaborating with Dr. Michael Walters who is involved in the development of MMG22 for phase 1 clinical trials. Other collaborative studies on MMG22 are being conducted by Dr. Banik from Anesthesiology, Dr. Bigiardi from Dermatology, and Dr. Simone from Dental Diagnostics. The Portoghese lab is presently working on a new approach to antinociception by design, synthesis, and evaluation of ligands that target MOR-DOR heteromers with Dr. Wilcox from Neuroscience. As their research revealed MMG22 to be an effective analgesic for neuropathic pain in homozygous sickle cell disease (SCD) mice, they have enlisted the collaboration of Dr. Vercellotti whose lab maintains a colony of SCD mice. They are excited about a new approach to SCD treatment using a combination of MMG22 and a TSPO antagonist (Ro5-4864) that enhances efficacy by 100-fold. Projects with Dr. Jon Hawkinson involve an opioid analgesic (BINTA) which was synthesized in the Portoghese lab and found to possess potent oral efficacy via targeting MOR/KOR without adverse effects. Progress is being made for eventual phase 1 clinical evaluation.

Dr. Carston R. Wagner’s lab has developed techniques to activate immune cells by designing protein-based nanorings that bind to the body’s T-cells, which then track down and eradicate tumor cells. They have developed a method for rapidly functionalizing T-cell surfaces without the need for genetic engineering. This research has demonstrated the ability to safely eradicate solid tumors in mice in addition to exhibiting effectiveness against breast cancer. The lab has also demonstrated that the FDA-approved drug trimethoprim can be used to switch off the nanorings to help address the potential toxic side effects that can sometimes arise from immune cell-based anticancer therapies.

Dr. Natalie Tretyakova’s research employs the tools of nucleic acid chemistry and biological mass spectrometry to investigate the structural origins of cancer and to develop sensitive and specific biomarkers of carcinogen exposure and risk. She is investigating DNA-protein cross-links (DPCs), which are helix-distorting DNA lesions that result from exposure to certain anticancer drugs, ionizing radiation, or environmental toxins. These lesions are thought to interfere with DNA-protein interactions due to their bulky nature, interfering with replication and repair. The lab seeks to discover the role that DPCs play in the development of human diseases and cancer. The lab is also researching DNA adduct formation by 1,3-butadiene, an important industrial chemical and known human carcinogen present in automobile exhaust, cigarette smoke, and forest fires. This project focuses on identifying the mechanisms of carcinogenicity and the biological targets of 1,3-butadiene in cells and tissues. Additional research includes investigating the origins of spontaneous DNA damage in unexposed cells and the epigenetic effects of chemical exposures and inflammation. Epigenetics controls the levels of gene expression by reversible modifications of DNA and histone proteins. This process is deregulated in many human diseases, including cancer. The lab is discovering DNA epigenetic marks and their protein readers as potential new targets for drug design.

Dr. Lisa Peterson’s lab has been studying the harmful effects of tobacco chemicals and the reasons for their tissue-specific effects. They characterize how these compounds damage DNA and how cells protect themselves against this damage. They are also investigating how chemicals in tobacco smoke interact with each other to form carcinogenic mixtures that harm humans. This work helps inform how government entities regulate tobacco products and chemicals in order to reduce harm to people. Dr. Peterson also oversees the measurement of biomarkers of exposure and effect in children’s samples as part of the Children’s Health Exposure Assessment Resource funded by the National Institutes of Health.
Research Activities: Labs of the ITDD

The Institute for Therapeutics Discovery and Development (ITDD) is a comprehensive drug discovery and development center whose capabilities range from high-throughput screening (HTS) through lead optimization and medicinal chemistry, to process chemistry and cGMP drug substance manufacturing.

In September the ITDD hosted the Annual Meeting of the Eunice Kennedy Shriver National Institute of Child Health and Human Development Contraception Research Branch, which provides funding for the ITDD’s research into the development of non-hormonal male contraceptive agents. This 80+ person international meeting was organized by Drs. Leigh Allen and Gunda Georg and took place over 2 lecture-filled days at the Walter Library on campus.

Dr. W. Thomas Shier’s lab is working to develop innovative drug discovery platforms designed to discover novel antibiotics and anticancer agents. One focus is on fungi that use mycotoxins to facilitate infection of plant roots from the soil. Ongoing studies of root infection mechanisms have revealed that these fungi release mycotoxins that target dividing cells in plant root tips (meristematic tissue) destroying the root tip and exposing the root vascular system through which the fungus can enter the plant. Known mycotoxins that play this role also kill dividing mammalian cells, so they are a potential source of novel anticancer drugs. Large numbers of fungal isolates of this type are available in the freezers of agricultural scientists, who are happy to collaborate. A second major focus is on developing a genome mining technique based on the genome mining technique Streptomyces species are assumed to have used to acquire known antibiotic biosynthetic enzyme gene cassettes. This type of approach could be used to seek novel antibiotics produced by unculturable soil microbes and to produce in quantity scarce marine natural products with drug potential, such as bryostatin.

Dr. Vadim Gurvich’s lab continues work on developing alternative analgesic treatments for moderate to severe pain that will minimize the potential for drug tolerance, dependence, and abuse by targeting opioid receptor hetomers. Another focus of the lab is to create a synthetic compound to be used in human clinical research studies within the National Institute on Aging for the treatment of Alzheimer’s disease. Dr. Gurvich is also the principal investigator on a newly-awarded National Institutes of Health contract for the development of a next-generation antidepressant. This work will be carried out in collaboration with Purdue University and a private company.

Dr. Robert Turesky’s lab continues biomarker research on hazardous chemicals found in the environment and diet or those sometimes found in chemotherapeutic or antiretroviral drugs which can become bound to protein or DNA. Adducts formed with proteins can lead to toxicity whereas adducts formed with DNA can lead to mutation and the onset of cancer. Using liquid chromatography-mass spectrometry, the lab is able to identify and quantify these adducts in human blood, saliva, and a variety of tissue samples to better understand their formation and to assess the toxicity and cancer risk associated with therapeutic drugs and environmental exposures.
Dr. Jon Hawkkinson’s lab conducts biochemical, biophysical, and cell-based assay development, high-throughput and fragment-based screening, structure-activity relationships, and hit characterization for small molecule probe and drug discovery. The lab collaborates in all therapeutic areas, including CNS (opioid receptors, EPO receptor, neurofibromatosis), cancer (Mcm10, phenotypic screening for breast cancer and leukemia), and reproductive health (Brdt, Tsk, Cdk2, Wee2, Rar, Gpr10). In collaboration with Dr. Philip Portoghese, Dr. Hawkkinson leads a drug discovery project to identify a development candidate to treat chronic pain devoid of opioid side effect liability.

Dr. Peter Dosa’s lab has been developing ATP-sensitive potassium channel openers as potential therapeutic agents for the treatment of glaucoma. These compounds have proven effective at lowering intraocular pressure in animal models. Dr. Dosa’s lab has also been pursuing a novel approach to preventing the recurrence of *Clostridium difficile* infections. Standard antibiotic-based strategies for the treatment of *C. difficile* infections disrupt indigenous microbiota and commonly fail to eradicate bacterial spores—two key factors that allow recurrence of infection. Dr. Dosa’s group has been developing bile acid derivatives designed to inhibit the germination of *C. difficile* spores without disrupting the indigenous microbiota, which should help reduce the chance of a reoccurrence of the infection.

Dr. Henry Wong’s lab focuses on the pre-clinical evaluation of the in vivo pharmacology of drug candidates. As Director of the Pharmacology Core in the ITDD, he is involved in the development of translational approaches to drug discovery that include cell-based assays, pharmacokinetic and pharmacodynamic analysis, efficacy in disease models, and non-GLP toxicology. Although Dr. Wong collaborates with investigators with a broad range of expertise, his own research has focused on oncology and inflammatory disease indications with emphasis on novel drugs that target tubulin dynamics.
Student Recognition

This year there were 60 students enrolled in the graduate program. A total of 9 students graduated and 11 students joined the department. Nicole Bentz, Caroline Buchholz, Parker Flanders, Jessica Fuller, Peng Ge, Pooja Hegde, Sinead King, Tian Lan, Brandi McKnight, Nicole Bentz, and Steve Wang.

Jordan Bauer (Harki Lab) received the 2017-2018 Dean’s Research Award, which recognizes outstanding research achievements by PharmD students.

Four former undergraduate students advised by Dr. Dan Harki contributed to an article in the February issue of the journal ChemMedChem. Jordan Baur (BS ’17), Tenley Brown (BS ’18), Jacob Edwards (BS ’14), and Hannah Skopec (BS ’14) coauthored an article titled “Helenalin Analogues Targeting NF-kB p65: Thiol Reactivity and Cellular Potency Studies of Varied Electrophiles,” which examines the development of simplified natural product analogues that can regulate the NF-kB signaling pathway - a mediator of the cellular inflammatory response that is implicated in a variety of diseases.

Joseph Buonomo (Aldrich Lab) was selected to receive the 2018 Abul-Hajj/Hanna Exceptional Graduate Student Award in Medicinal Chemistry. This award is given each year based on a graduate student’s quantity and quality of research accomplishments, the quality of their original research proposal for the oral exam, the quality of seminars and colloquia, their Graduate Course grade-point average since entering the program, and service and citizenship in departmental affairs. Joseph presented a departmental seminar in association with this award in May titled “Design of Antitubercular Chemotherapeutic Agents that Evade Resistance.”

Sara Coulup (Georg Lab) and Jian Tang (Harki Lab) were both selected to receive the 2018-2019 Bighley Graduate Fellowship. The fellowship was established in 2008 by Dr. Lyle D. Bighley and Sharon Bighley as a way to support graduate students working in the biomedical health sciences. It recognizes excellence in students conducting research in laboratories with an emphasis on collaborative and interdisciplinary work.

Katlyn Fleming (Haskell-Luevano Lab) was awarded the 2018-2019 Rowell Graduate Fellowship, which was established by the family of pharmaceutical industrialist Theodore H. Rowell to support graduate students in the pharmaceutical sciences with an emphasis on drug delivery systems.

Katlyn was also invited to give an oral presentation at the 2018 Gordon Research Conference on Chemistry and Biology of Peptides in Ventura, California. Her presentation was titled “Structure-Activity Relationship Studies of a Macrocyclic AGRP-Mimetic Scaffold c[Pro-Arg-Phe-Asn-Ala-Phe-DPro] Yields Potent and Selective Melanocortin-4 Receptor Antagonists that Increase Food Intake” and took place in the “Innovations in the Synthesis and Design of Peptides with Biomedical and Biomaterial Applications” session.

Jenna Fernandez (Tretyakova Lab) gave a talk at the American Association for Cancer Research special conference in Atlanta, Georgia. The conference, which took place in April, focused on “Targeting DNA Methylation and Chromatin for Cancer Therapy” and highlighted the progress made around the role of epigenetics in carcinogenesis in the past twenty years. Jenna’s presentation was titled “Identification of Specific Readers of Epigenetic Modifications in Human Bronchial Epithelial Cells Using a Quantitative Proteomics Approach.”

Travis Hammerstad (Aldrich Lab), Thomas Millunchick (Harki Lab), Maggie Schreiner (Doran Lab), Samuel Syberg (Harki Lab), and David Wang (Wagner Lab) were all awarded 2018 Undergraduate Research Opportunity Program (UROP) Scholarships. Undergraduate students who receive UROP scholarships are given the opportunity to work on research projects with faculty members and present the results of their work at a symposium.

Alex Hurben (Doran Lab) was selected as a trainee for the National Institutes of Health T32 Chemistry-Biology Interface Training Grant. The grant program allows first-rate students to grow into accomplished professionals both in their primary area of interest and in a complementary field through interdisciplinary research interactions and experiences. Alex will be working with Drs. Doran and Tretyakova to identify harmful oxidation products that drive Alzheimer’s and Parkinson’s diseases.
Kellan Passow (Harki Lab), was awarded the Biological Chemistry Division Travel Award, as well as the American Chemical Society Minnesota Section Travel Grant in order to attend the Fall 2018 ACS meeting in Boston. Both travel awards are offered on a competitive basis for graduate students and postdoctoral fellows who plan to present a poster or oral presentation of their research at the yearly National ACS Meeting.

Chris Richards (Pharmacology, Harki Lab) was selected to receive the 2018 Beatrice E. Milte and Theodore Brandenburg Award, which is granted to six or fewer graduate students on an annual basis and recognizes exceptional thesis research by a graduate student in the basic biomedical sciences.

Alex Strom (Wagner Lab) was awarded an American Foundation for Pharmaceutical Education Pre-Doctoral Fellowship. The fellowship seeks to positively impact patient and public health by supporting high performing students who possess the skills and aptitude to become outstanding scientists and leaders in the pharmaceutical industry, academia, and government/nonprofit sectors. Alex Strom and his mentor, Dr. Carston R. Wagner, are conducting research to address the opioid crisis with their project “Probing a new target HINT1 for the management of chronic pain through analgesia and the reversal of opioid tolerance.”

MIKI Meeting 2018

Held annually since 1963, the MIKI “meeting-in-miniature” is the oldest and most successful regional meeting in medicinal chemistry. Meetings are organized by medicinal chemistry graduate students at the Universities of Minnesota, Iowa, Kansas, and Illinois, and rotate between each location yearly.

The University of Illinois at Chicago hosted the 56th Annual MIKI meeting in April, which featured a keynote lecture by Dr. Michelle Arkin from the University of California, San Francisco School of Pharmacy titled, “Tackling Challenging Targets, a Biophysical Perspective.”

Four graduate students from the department made presentations at the 2018 meeting on behalf of the University of Minnesota:

- Joseph Buonomo (Aldrich Lab), “Recent Advances in Redox Recycling Reaction Design.”
- Cliff Csizmar (Wagner Lab), “Leveraging Affinity and Avidity to Control Intercellular Interactions.”
- Sara Coulup (Georg Lab), “Total Synthesis of Metabolically Stabilized Analogs of Pironectin.”
- Shaofei Ji (Tretyakova Lab), “Reversible DNA-protein Cross-linking at 5-Formylcytosine and its Effects on Replication and Transcription.”

Sara Coulup (Georg lab) won the Best Oral Presentation Award at this year’s meeting for her talk “Total Synthesis of Metabolically Stabilized Analogs of Pironectin.”

Degrees Awarded

Trinh Amy Doan Holth
Degree: Ph.D.
Advisor: Gunda Georg
Thesis Title: Design and Synthesis of Natural Product Analogs of Stevioside and Synthetic Analogs of Retinoic Acid

Katherine Nicole Schlasner
Degree: M.S.
Advisor: Carrie Haskell-Luevano
Thesis Title: Tetrapeptide Melanocortin Agonist Ligands Exploring Selectivity of the mMC3R Using DPhe Substitutions in the Ac-His-Arg-DPhe-Tic-NH2 Scaffold

Arnold Scott Groehler, IV
Degree: Ph.D.
Advisor: Natalia Tretyakova
Thesis Title: Mass Spectrometry-based Characterization, Quantitation and Repair Investigations of Complex DNA Lesions
F. Peter Guengerich
Mark Cushman and Gunda Georg
Gunda Georg, Richard Glennon, Philip S. Portoghese

Seminars

Ole Gisvold Memorial Lecture
April 3
Mark Cushman, Distinguished Professor, Medicinal Chemistry, Purdue University, “How the Janus Kinases Hijacked Our Topoisomerase I Inhibitor Project”

Philip S. Portoghese Spring Distinguished Lecture
April 10
Richard Glennon, Professor, Medicinal Chemistry, Virginia Commonwealth University, “Drug Discrimination: A Behavioral Technique to Investigate Centrally-acting Agents”

Philip S. Portoghese Fall Distinguished Lecture
October 16
P. Jeffrey Conn, Lee E. Limbird Professor, Vanderbilt University, “Allosteric Modulators of GPCRs as a Novel Approach for Treatment of Schizophrenias”

Taito O. Soine Memorial Lecture
October 23
Ruth Wexler, Executive Director, Bristol-Myers Squibb, “Discovery of Novel Anticoagulants: New Frontiers and Lessons Learned”

Fall 2018 Distinguished Seminar Lecture
December 11
F. Peter Guengerich, Tadashi Inagami Professor, Vanderbilt University, “How Cytochrome P450 and Other Redox Enzymes Make and Break C-C Bonds: Relevance to Drugs”

Aniekan Matthew Okon
Degree: Ph.D.
Advisor: Carston R. Wagner
Thesis Title: Development of Chemical Probes for Intracellular Nucleotide Delivery, Profiling of the Metabolic Fate(s) of Nucleoside Monoester Phosphoramidates, and a Nucleotide Mimetic Inhibitor of eIF4E

Joseph Anthony Buonomo
Degree: Ph.D.
Advisor: Courtney Aldrich
Thesis Title: Selective Chemistry to Improve Organic Chemistry and Drug Discovery

Clifford Michael Csizmar
Degree: Ph.D.
Advisor: Carston R. Wagner
Thesis Title: Engineered Proteins for Studying and Controlling Cellular Recognition

Matthew Ronald Bockman
Degree: Ph.D.
Advisor: Courtney Aldrich
Thesis Title: Targeting Two Late-Stage Enzymes of the Mycobacterium Tuberculosis Biotin Biosynthetic Pathway

Christopher L. Seiler
Degree: Ph.D.
Advisor: Natalia Tretyakova
Thesis Title: Epigenetic Mechanisms in Lung Cancer

Jillian Lynn Kyzer
Degree: Ph.D.
Advisor: Gunda Georg
Thesis Title: Design and Synthesis of Retinoic Acid Receptor Alpha Antagonists for Male Contraception
Other seminars in 2018 by the Department of Medicinal Chemistry, the Chemical Biology Initiative (CBI), the Epigenetics Consortium, and the Institute for Therapeutics Discovery & Development (ITDD):

**January 16**
David Case, Distinguished Professor, Department of Chemistry & Chemical Biology, Rutgers University, “Probing the Dynamics of Biomolecules in Crystals and in Solution.”

**January 18**
Phu Tran, Assistant Professor, Department of Pediatrics, University of Minnesota, “Coordinated Roles of Iron-dependent PHD and JARID in Early-life Iron Deficiency-induced Adult Neural Gene Dysregulation.”

**January 23**
Joseph Topczewski, Assistant Professor, Department of Chemistry, University of Minnesota, “Harnessing the Winston Rearrangement for Chiral Amine Synthesis.”

**January 26**
Kathryn Nelson, Walters Lab, “Caspase-2 as Novel Target for Tauopathy-related Cognitive Decline.”

**January 29**
John Santini, President and CEO, ApoGen BioTechnologies, “Translating Big Ideas into Novel Therapies... from Science to Entrepreneurial Startups.”

**January 30**
Griff Humphreys, Executive Director, Bristol-Myers Squibb, “Endogenous Biomarkers for Transporter Function.”

**February 6**
Blake Peterson, Regents Distinguished Professor, Medicinal Chemistry, University of Kansas, “Chemical Tools for Studies of Biological Systems.”

**February 12**
Dustin Maly, Professor and Raymon E. and Rosellen M. Lawton Distinguished Scholar, Department of Chemistry, University of Washington, “Allosteric Modulation of Protein Kinases with Small Molecule Inhibitors.”

**February 13**
Garrett Schey, Distefano Lab, “Disrupting Glycosomal Import: A Novel Drug Target for the Treatment of Trypanosomiasis.”

**February 20**
Rebecca Cuellar, Research Assistant Professor, Georg Lab, “Safety Seminar.”

**February 27**
Conrad Fihn, Carlson Lab, “Targeting a Molecular Chaperone: Treatment of Triple Negative Breast Cancer and Beyond.”

**March 6**
Paul Ang and Malik Mitchell, “Campus Climate: Preventing Harassment.”

**March 22**
Moshe Szyl, Glaxo Smith Kline and James McGill Professor, Department of Pharmacology & Therapeutics, McGill University Medical School, “How Experience is Registered in Our DNA - A Role for DNA Methylation.”

**March 26**
Chemical Biology Initiative Training Grant Student Talks:

- **Kellan Passow**, Harki Lab, “Photochemically Responsive Nucleosides as Biological Tools.”

**April 9**
Steve Ekker, Professor and Consultant, Dept. Biochemistry and Molecular Biology, Mayo Clinic, “How to Join the Genome Writers Guild.”

**April 17**
Terry Moore, Assistant Professor, Medicinal Chemistry & Pharmacognosy, University of Illinois, “Development of Chemical Probes for Transcription Factor Interactions.”

**April 19**
Dewey McCafferty, Professor of Chemistry, Duke University, “Histone Demethylases.”

**April 24**
Craig Thomas, Leader, Chemistry Technologies, National Center for Advancing Translational Sciences, NIH, “Accelerating Translation: Strategies for Rapid Probe Development, Drug Combination Discovery, and Precision Medicine.”

**May 1**

**May 24**
Bethany Buck-Koehntop, Assistant Professor, University of Utah, “Investigating Zing Finger Regulation of Epigenetically Modified DNA in Cancer.”

**June 5**
**John Schultz**, Graduate Student, Aldrich Lab, “Potentiation of Multiple Antibacterial Agents in MRSA and M. tuberculosis.”

**June 7**
Jerry Strauss, Professor, Virginia Commonwealth University School of Medicine, “Sperm Tales: The Manchette as a Target for Male Contraception?”

**June 8**
**Mark Ericson**, Research Assistant Professor Candidate, Haskell-Luevano Lab, “The Synthesis and Characterization of Novel Melanocortin-4 Receptor Probes.”

**June 26**
**Anand Divakaran**, Graduate Student, Pomerantz Lab, “N-Terminal BET Bromodomain Inhibition using MAPKInase Inhibitors.”

**July 24**
**Bill McCue**, Graduate Student, Finzel Lab, “Structure-guided Targeting of the Hydoroman Binding Domain of CD4.”

**July 31**
**Connor McDermott**, Graduate Student, Ambrose Lab, “Mining Unexpected Chemical Space: Bioterror Countermeasures and Geopharmaceuticals.”

**August 7**
**Ellie Mews**, Graduate Student, Wagner Lab, “Development of Fibroeenctin-based Chemically Self-assembled Nanorings (CSANS) for Immunotherapy.”

**August 14**
**Dmitri Konorev**, Graduate Student, Turesky Lab, “Development of Protein and DNA Adduct Biomarkers from Carcinogens in Cooked Meats and Tobacco Smoke by Liquid Chromatography-Mass Spectrometry.”

**August 15**
Chuan He, John T. Wilson Distinguished Service Professor, University of Chicago, “DNA and RNA Methylation in Gene Expression Regulation.”

**August 28**

**September 4**
Brandt Eichman, Professor, Vanderbilt University, “New DNA Repair Mechanisms Revealed from Bacterial Resistance to Genotoxic Natural Products.”

**September 6**
Jorden Johnson & Carrie Jones, Assistant Professor, Vanderbilt University, “Development of Selective M5 Negative Allosteric Modulators for Opioid Use Disorder.”

**September 11**
**Alexander Harben**, Graduate Student, Doran Lab, “Restoring Vision through Chemical Photoswitches: A Potential Therapy for Retinitis Pigmentosa.”

**September 21**
Beyong Hwa (BH) Yun, Research Assistant Professor Candidate, Turesky Lab, “Biomonitoring DNA Adducts of Genitourinary Carcinogens using Formalin-Fixed Paraffin-Embedded (FFPE) Tissues and Exfoliated Urinary Cells; Untapped Biospecimens for Cancer Biomarker Research.”

**September 25**
Samantha Kennelly, Graduate Student, Harki Lab, “The Development and Usage of Fluorescent Probes for Surgical Tumor Removal.”
October 1  Bo Li, Assistant Professor, University of North Carolina, Chapel Hill, “Mighty Chemistry of Bacterial Small Molecules.”

October 2  Amy Donay, Assistant Professor, Colorado College, “Design, Synthesis, and Evaluation of New Drugs for African Sleeping Sickness.”

October 5  Jingshu Guo, Research Assistant Professor Candidate, Turesky Lab, “High-resolution Mass Spectrometry-Based Strategies in Biomonitoring Carcinogen Exposures in Humans.”

October 9  Brian Gabet, Graduate Student, Georg Lab, “Design of Novel PDE2A Inhibitors for the Treatment of Cognitive Disorders.”

October 15  Sudipta Shaw, Post-Doctoral Associate in Elias Lab, BioTechnology Institute, University of Minnesota, “Bacterial Phosphate Uptake System: Molecular Mechanism and Engineering.”

October 18  Shujun Liu, Associate Professor, Hormel Institute University of Minnesota, “A Dynamic N6-methyladenosine Methylyome Regulates Intrinsic and Acquired Drug Resistance.”

October 30  Robert Huigens III, Assistant Professor, University of Florida, “Phenazine Antibiotics and Indole Alkaloids: New Platforms for Discovery.”

November 6  Jacob Bouchard, Graduate Student, Doran Lab, “A Molecular Chaperone Approach to Treat Transthyretin Amyloidosis.”

November 12  Yimon Aye, Associate Professor, Laboratory of Electrophiles and Genome Operations (LEAGO) - Switzerland, “Illuminating Signaling Crosstalk Regulated by Native Reactive Electrophiles.”

November 13  Jacob Patterson, Graduate Student, Doran Lab, “Targeting the Immunomodulator SPPL2a as a Novel Approach to Treating Multiple Sclerosis.”

November 19  Donald R. Ronning, Professor, University of Toledo, “Hits and Misses in Targeting Tuberculosis with Covalent Inhibitors.”

November 20  Md Abdullah Al Noman, Graduate Student, Georg Lab, “IRAK-4 Inhibitors for Inflammation.”

November 27  Jennifer Allen, Director of Medicinal Chemistry, Amgen, “Beta-Secretase Research at Amgen: Past, Present and Future.”

November 29  Joseph Landry, Assistant Professor, Virginia Commonwealth University, “Enhancement of Breast Tumor Cell Immunogenicity as a Strategy for Chemosensitization.”

December 3  Bradley L. Pentelute, Associate Professor, Massachusetts Institute of Technology, “Cysteine Arylation to Engineer, Deliver, and Discover Proteins.”

December 3  Ajay Yekkara, Co-Founder and CSO, Blue Therapeutic, “Molecular Mechanisms to Develop Pain Therapeutics.”

December 4  James Janelka, Associate Professor, Washington University, “Inhibitors of Post-translational Proteases: Overcoming Resistance to Targeted Therapies in Cancer.”

December 18  Patrick Woster, SmartState for Drug Discovery Endowed Chair & Professor, Medical University of South Carolina, “Epigenetic Modulators as Potential Therapeutics for Cancer and Other Diseases.”

Research Grants

- (-)-Phenserine Tartrate Clinical Material Storage and Certificate of Analysis Evaluation Support Services .................................................. Vadim Gurvich
- Adjuvant Discovery Program .......................................................... Sunil David
- Administration of the National Institute for Pharmaceutical Technology & Education ............................................................. Vadim Gurvich
- Anti-Cancer CSANs Development .................................................. Carston R. Wagner
- APOBEC3 Structural Studies .......................................................... Daniel Harki
- Cell-cycle Regulatory Kinases as Targets for Male Contraceptive Drug Development ............................................................ Gunda Georg
- Chemical Interrogation of Human DNA Cytosine Deaminases ....... Daniel Harki
- Chemical Mechanisms of Toxicology ............................................. Natalia Tretiyakova
- Critical Path Manufacturing Sector Research Initiative .............. Vadim Gurvich
- CRO Support for NCATS Drug Substance Development and Manufacture.Vadim Gurvich
- Design and Synthesis of Stabilized Pironetin Analogs for the Treatment of Resistant Ovarian Cancers ...................................... Sarah Coulup
- Design and Synthesis of TLR7, TLR8, and NLRP3 Immunostimulatory Agents .......................................................... David Ferguson
- Development of a Fluorescence Polarization DNA Displacement Assay and Its Utilization for the Discovery of APOBEC3B Ligands .............. Daniel Harki
- Development of an APOBEC3B CETA Assay and Compound Testing ...... Daniel Harki
- Development of an Oral Formulation of a Metabolite of Ketamine, 2R,6R-HNK, as a Next-generation Antidepressant .......... Vadim Gurvich
- Development of Gut-restricted Bile Acids Analog Inhibitory to C. difficile Infection ................................................................. Peter Dosa
- Development of Zika Virus-specific Serodiagnostic Immunoassays and Evaluation of Zika Virus Env-derived Antigens for Subunit Vaccines .... Sunil David
- Discovery of Opioid Receptor Endogenous Allosteric Modulators for the Treatment of Pain and Addiction ............................ Carrie Haskell-Luevano
- DNA Cross-Linking By Diepoxybutane ......................................... Natalia Tretiyakova
- DNA Protein Cross-Links:Cellular Effects and Repair Mechanisms Natalia Tretiyakova
- Engineering Reversible Cell-Cell Interactions with Chemically Self-Assembled CARs ....................................................... Cliff Csizmar
- Enzymatic Protein Labeling .......................................................... Carston R. Wagner
- Establishment, Colonization, Toxin Production and Development of the Charcoal Rot Fungus, Macrophomina Phaseolina on Soybean During the Disease Life Cycle: Basic Biology .................................. W. Thomas Shier
- High-throughput Screen to Discover SERCA Activators for Heart Failure Therapy ......................................................... Courtney Aldrich
Ways to Give

Private support of our activities is important to maintain the quality of our program and the continuation of the mission of the department. Even small contributions accumulate over time and can have a significant impact.

Opportunities for giving include:

- Abul-Hajj-Hanna Exceptional Graduate Student Award in Medicinal Chemistry
- Dr. Lyle and Sharon Bighley College of Pharmacy Pharmaceutical Development Fund
- Medicinal Chemistry Alumni Graduate Student Fellowship
- MIKI Meeting Fund
- Ole Gisvold Fellowship in Medicinal Chemistry
- Philip S. Portoghese Fellowship in Medicinal Chemistry
- Philip S. Portoghese Lectures in Medicinal Chemistry
- Remmel and Zimmerman Fellowship in Drug Metabolism and Pharmacokinetics
- Carston Rick Wagner Fellowship
- Yusuf J. Abul-Hajj Fellowship in Medicinal Chemistry
- Rodney L. Johnson Medicinal Chemistry Fellowship
- Medicinal Chemistry/Pharmacognosy Fund

Our Associate Development Officer Joe Kolar will work with you and answer any questions that you might have. He can be reached by e-mail, kolarj@umn.edu, or phone (1-612-625-6305).

Faculty

Yusuf J. Abul-Hajj .................. Professor Emeritus
Eyup Akgün ...................... Research Associate Professor
Courtney C. Aldrich ............ Professor
Elizabeth A. Ambrose .... Associate Professor
Rebecca Cueller .................. Research Assistant Professor; Principal Scientist
Sunil David ....................... Bennett Professor
Todd Doran ...................... Assistant Professor
Peter Dosa ....................... Research Associate Professor; Associate Director, ITDD Medicinal Chemistry Core
Earl Dunham .................... Emeritus Faculty
Mark Ericson ..................... Research Assistant Professor
David Ferguson ................. Professor
Barry Finzel ...................... Professor; Director of Graduate Studies
Gunda I. Georg .................. Department Head; Regents Professor; Director, ITDD; Director, Medicinal Chemistry Core; Robert Vince Endowed Chair; McKnight Presidential Chair
Jingshu Guo ..................... Research Assistant Professor
Vadim J. Gurvich .............. Research Associate Professor; Associate Director and Director of Chemical Process Development, ITDD
Patrick E. Hanna............ Professor Emeritus
Daniel Harki................. Associate Professor
Carrie Haskell-Luevano...... Professor; Philip S. Portoghese Endowed Chair in Chemical Neuroscience; Associate Department Head; Institute for Translational Neuroscience Scholar
Jon Hawkins................ Research Professor; Director of High-Throughput Screening, ITDD
Rodney L. Johnson.......... Distinguished Professor
Herbert Nagasawa........... Professor Emeritus
Kathryn Nelson.............. Research Assistant Professor
Philip S. Portoghese....... Distinguished Professor
Rory Remmel................. Distinguished Teaching Professor
Wayne Thomas Shier........ Professor
Marilyn K. Speedie......... Dean Emeritus; Professor
Natalia Tretyakova.......... Distinguished McKnight University Professor
Robert Turesky............. Professor; Masonic Cancer Center Chair in Cancer Causation
Carston Rick Wagner....... Professor; Endowed Chair in Medicinal Chemistry
Michael Walters............ Research Associate Professor; Director of Lead Probe Discovery, ITDD
Henry Wong.................. Research Associate Professor; Associate Program Director of Pharmacology and Biomarkers, ITDD
Byeong Hwa Yun............ Research Assistant Professor

Adjunct Faculty
Erin Carlson................. Associate Professor, Chemistry
Mark D. Distefano.......... Distinguished McKnight Professor, Chemistry
Stephen S. Hecht.......... Professor, Pharmacology; Wallin Land Grant Professor of Cancer Prevention, Laboratory Medicine and Pathology
Thomas R. Hoye............ Distinguished University Teaching Professor, Chemistry; Distinguished Professor, College of Science and Engineering
Lisa Peterson............... Professor, Environmental Health Sciences
Valérie C. Pierre.......... Associate Professor, Chemistry
William C. Pomerantz..... Associate Professor, Chemistry; McKnight Presidential Fellow

Administrative Staff
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Minsoo Ahn................ Executive Accounts Specialist, David Lab
Leigh Allen................ Assistant to the Department Head
Caitlinoley............... Executive Operations Student Services Specialist
Lorri Chapman............. Project Manager, REACH
Mary Crosson............... Administrative Manager
Sandy Dewing............... Associate Administrator, Journal of Medicinal Chemistry

Katie Gray.................. Student Office Assistant
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Megan Jensen............... Executive Office and Administrative Specialist
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Brittney Torguson......... Student Office Assistant
Erin Warholm-Wohlenhaus.. Executive Office and Administrative Specialist

Research Staff
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Sesha Krishnamachari..... Researcher 5, Turesky Lab
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Alexander Lee............... Researcher 1, Tretyakova Lab
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Henry Schares............... Researcher 3, Harki Lab
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Defeng Tian................ Researcher 6, Hawkins Lab
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Timothy Ward .................................. Researcher 6, Georg Lab
Stacey Wilber .................................. Researcher 3, Haskell-Luevano Lab
Lihua Yao .................................. Researcher 3, Turesky Lab

Postdocs, Fellows, & Visiting Scholars

Mohamed Abou-Karam ----------- Shier Lab
Sana Aslam ................................. Shier Lab
Janardhan Banothu ...................... David Lab
Marzena Baran ............................... Aldrich Lab
Madjda Bellamri ............................ Turesky Lab
Haoqing Chen .............................. Turesky Lab
Ziyu Cui ..................................... Turesky Lab
Surendra Dawadi ......................... Aldrich Lab
Skye Doering ............................... Haskell-Luevano Lab
Jingshu Guo .................................. Turesky Lab
Leila Hejazi .................................. Turesky Lab
Trinh (Amy) Hohlth ................. Georg Lab
Kwan Ho (John) Hong ................. Georg Lab
Ziwei Hu .................................. David Lab
Yu Jiao .......................................... Georg Lab
Lakmal Kotelawala ....................... Wagner Lab
Yupeng Li .................................. David Lab
Guru Swamy Madugundu .......... Tretyakova Lab
Soma Maitra ................................. Georg Lab
Neeraj Mishra .............................. Aldrich Lab
Ramkumar Moorthy ..................... Harki Lab
Ali Nakhi .................................. Dosa Lab
Balaji Pathakumari ....................... David Lab
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Jacob Petersburg ......................... Wagner Lab
Suresh Pujari .................................. Tretyakova Lab
Kaja Rozman .................................. Aldrich Lab
Lakmal Rozumalski ....................... Wagner Lab
Gurpreet Singh ......................... Walters Lab
Yi Wang ...................................... Turesky Lab
Benjamin Walker ......................... Tretyakova Lab
Yueting Wang ............................ Shier Lab

Lihua Yao ................................. Georg Lab
Fang Yu ...................................... Georg Lab
Shun Xiao ................................... Turesky Lab
Mu Yang .................................... Doran Lab

Graduate Students

Evan Alexander ................. Aldrich Lab
Nicole Bentz .............................. Wagner Lab
Matthew Bockman ........................ Aldrich Lab
Emily Boldry .............................. Tretyakova Lab
Jacob Bouchard ....................... Doran Lab
Scott Brody ............................... Aldrich Lab
Caroline Buchholz ...................... Pomerantz Lab
Joseph Buonomo ....................... Aldrich Lab
Katelyn Capistrant .............. Finzel Lab
Erick Carlson ......................... Georg Lab
Haoqing Chen ............................. Turesky Lab
Malcolm Cole ............................ Aldrich Lab
Sara Coulup ............................... Georg Lab
Cliff Csizmar ................................ Wagner Lab
Amanda Degner ......................... Tretyakova Lab
Maxwell Dillenburg ................... Wagner Lab
Anand Divakaran ....................... Pomerantz Lab
Erik Faber ................................. Georg Lab
Jenna Fernandez ....................... Tretyakova Lab
Conrad Fihn ............................. Carlson Lab
Parker Flanders ....................... Ambrose Lab
Katlyn Fleming ...................... Haskell-Luevano Lab
Jessica Fuller ............................ Finzel Lab
Brian Gabet .............................. Georg Lab
Peng Ge .................................. Doran Lab
Michael Grillo ......................... Harki Lab
Arnold Groehler ....................... Tretyakova Lab
Xianghong Guan ....................... Georg Lab
Pooja Hegde ............................. Aldrich Lab
Alexander Hurben ..................... Doran Lab
Jiewei Jiang .............................. Georg Lab
Caitlin Jokipii Krueger ........ Tretyakova Lab
Samantha Kennelly .................. Harki Lab
Ozgun Kilic ............................... Wagner Lab
Sinead King............................Aldrich Lab
Zoe Koerperich......................Haskell-Luevano Lab
Dmitri Konorev......................Turesky Lab
Jillian Kyzer.........................Georg Lab
Tian Lan...............................Aldrich Lab
William McCue.......................Finzel Lab
Connor McDermott..................Ambrose Lab
Brandi McKnight.....................Doran Lab
Ellie Mews............................Wagner Lab
Md Abdullah al Noman.............Georg Lab
Aniekan Okon........................Wagner Lab
Kellan Passow.......................Harki Lab
Jacob Patterson.....................Doran Lab
Garrett Schey.......................Distefano Lab
Katherine Schlasner.................Haskell-Luevano Lab
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Josh Shirley..........................Carlson Lab
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Harrison Trent West...............Wagner Lab
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Taylor Davey.......................Doran Lab
Emina Dzafic.........................Tretyakova Lab
Travis Hamerstad.................Aldrich Lab
Madison Helm.......................Georg Lab
Nicolai Kessler.....................Remmel Lab
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Meghan Majors......................Haskell-Luevano Lab
Greg Mannino......................Aldrich Lab
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Tommy Millunchick.................Harki Lab
Dominic Najar......................Tretyakova Lab
Thomas Perry.......................Wagner Lab
Ton-Hy Pha..........................Doran Lab
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Sydney Schmidt.....................Harki Lab
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Sam Syberg.........................Harki Lab
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Angie Tran..........................Aldrich Lab
Lauren Warmka....................Ambrose Lab
David Wang.........................Wagner Lab
Henok Yared.......................Ferguson Lab
Andrew Zhou.......................Wagner Lab

Undergraduate Research Assistants & Summer Scholars

Christian Adams......................Remmel Lab
Joseph Ahenkorah..................Aldrich Lab
Medinat Akindele...................Tretyakova Lab
Jordan Baur.........................Harki Lab
Zeliha Betul........................Georg Lab
Hannah Boman.......................Tretyakova Lab
Alistair Crabb.......................Shier Lab
David Cullen.........................Harki Lab

Undergraduate Research Assistants & Summer Scholars
Publications Featuring Faculty & Staff (From Pg. 7)


Publications By Faculty & Staff

Eyu Akgun


Courtney Aldrich


Sunil David


**Todd Doran**


**Peter Dosa**


**Mark Ericson**


**David Ferguson**


**Barry Finzel**


**Gunda Geord**


Jingshu Guo


Vadim Gurvich

Daniel Harki


Carrie Haskell-Luevano


Jon Hawkinson


Kathryn Nelson


Philip Portoghese


Rory Remmel


W. Thomas Shier


Marilyn Speedie


Natalia Tretyakova


**Michael Walters**


**Henry Wong**


**Byeong Hwa Yun**


