MEDICINAL CHEMISTRY

MC2

COLLABORATIVE

2017 - 2018

MEDICINAL CHEMISTRY

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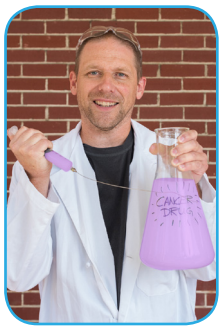
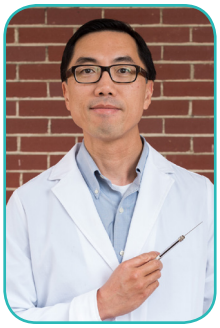

Colin Cameron


Nadja Cech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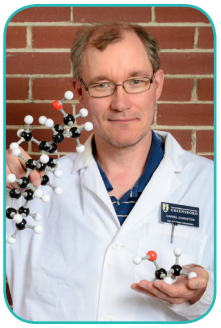
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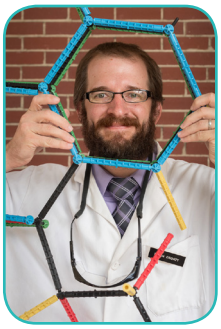
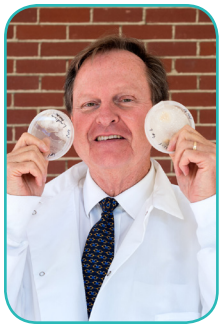

Mitchell Croatt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MCSQUARED RESEARCH SCIENTISTS

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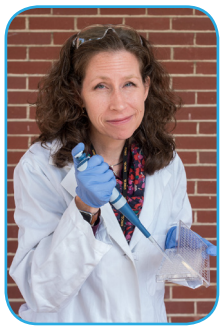
Sherri McFarland


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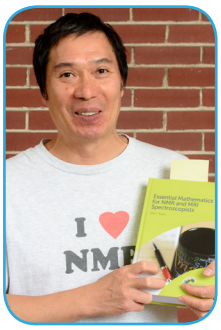
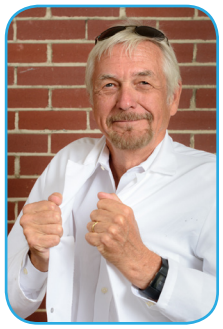

Franklin Moy


Nicholas Oberlies


Cedric Pearce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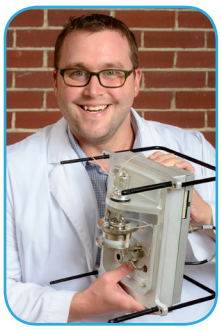
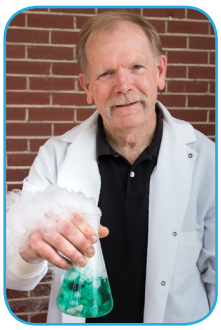
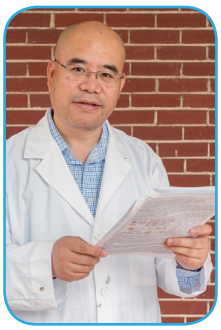

Daniel Todd


Jerry Walsh


Qibin Zhang

Greetings from the Medicinal Chemistry Collaborative (MCsquared). We are scientists, entrepreneurs, engaged citizens and students who share the common goal of harnessing the energy of collaboration to improve human health. Our name was inspired by Einstein's famous equation, $E=MC^2$, and is emblematic of the philosophy that together we can accomplish immeasurably more than would be possible alone. This past year we have seen this philosophy bear fruit over and again, in our interactions with each other, our colleagues across disciplines at UNC Greensboro, and members of our community. The science geeks among us celebrate publishing 47 collaborative peer-reviewed journal articles and winning 18 new research grants, totaling well over $1,000,000 in annual direct costs. These funds support an array of research projects, including ongoing efforts to develop novel treatments for drug resistant bacterial infections and cancer. As importantly, grant funds provide opportunities for training the next generation of scientists. These young people are a source of daily inspiration; you can read about a few of their stories on the following pages. We are also proud of the selflessness of our student members, who volunteered and helped organize half a dozen outreach opportunities in the past year. These activities are part of our ongoing efforts to cultivate a love of science for K-12 students in the Triad and beyond and to create a more diverse and inclusive community of individuals participating in STEM. Another hallmark MCsquared activity in the past year was a trans-disciplinary event at the National Humanities Center We brought together experts in education, science, history and philosophy for dialog about storytelling as a common thread that cuts across disciplines. The theme of fostering communication and understanding beyond disciplinary boundaries continues for us in the coming year as we prepare to host Alan Alda, award winning actor and director, best-selling author and founder of the Alda Center for Communicating Science. Learn more about this event at mcsquared.uncg.edu/alda. With many thanks to all those who have contributed to making the past year a resounding success, it is our great pleasure to share a few highlights of 2016-2018 with you. We look forward to working with all of you in the coming year as we continue to make new discoveries, fueled by the power of collaboration.

Nadja B. Cech
Patricia A. Sullivan Distinquished Prof. of Chemistry
Co-Director, Medicinal Chemistry Collaborative

Nicholas H. Oberlies
Patricia A. Sullivan Distinquished Prof. of Chemistry
Co-Director, Medicinal Chemistry Collaborative

YEAR AT A GLANCE | APRIL 2017 - APRIL 2018

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FUNDING
Number of Grants Continuing: 26, totalling $3,096,983
Number of Grants Funded: 18, totalling $1,340,623
Number of Grants Pending: 26, totalling $7,731,912
Number of Grants Not Funded: 8, totalling $5,646,608

PUBLICATIONS
Number of Publications by All MCsquared Members: 80
Number of Co-Authored Publications by MCsquarred Members: 47
Number of Publications Including Graduate Student Authors: 42
Number of Publications Including Undergraduate Student Authors: 31

PATENTS
Number of Invention Disclosures: 1
Number of Nonprovisional Submitted: 6
Number Issued: 1

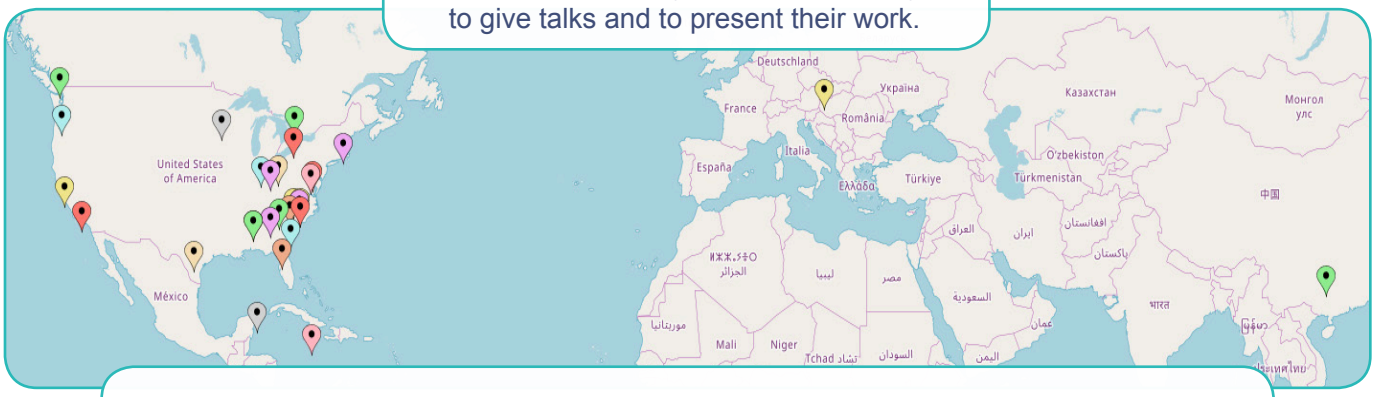
PRESENTATIONS
Number of Presentations by All Members: 128
Number of Presentations by Graduate Students: 119
Number of Presentations by Undergraduate Students: 37

FACULTY AWARDS
Patricia A. Sullivan Distinquished Professors of Chemistry
UNC Greensboro Junior Research Excellence
UNC Greensboro Gladys Strawn Bullard Award
UNC Greensboro Mary Settle Sharp Award for Teaching Excellence
North Carolina Biotechnology Center Academic Development Excellence Award

YEAR AT A GLANCE | APRIL 2017 - APRIL 2018

MEDICINAL CHEMISTRY MC2 COLLABORATIVE

MCsquared research scientists visited 24 locations nationally and internationally to give talks and to present their work.



SYMPOSIA ORGANIZED BY MCSQUARED RESEARCH SCIENTISTS

Mass Spectrometry Symposium, Southeastern Regional ACS Meeting
Natural Products & Entrepreneurship Symposium, Southeastern Regional ACS Meeting
Advances in Organic Synthesis, Southeastern Regional ACS Meeting
Creating and Performing Stories in the Humanities & Sciences, National Humanities Center
American Society for Photobiology Meeting
Stanford University Wender Symposium

MEDICINAL NATURAL PRODUCTS CHEMISTRY RESEARCH: FROM LAB TO CLINIC

This was a scientific symposium that featured leaders in the field of basic and clinical natural products research. Topics included natural product biosynthesis, chemical ecology and cancer drug discovery. This was a free event pitched to a general scientific audience, including students, faculty and community members.

Joanna Burdette, PhD
Associate Professor
Department of Chemistry & Pharmacongnosy
University of Illinois at Chicago
"Natural products as a source of inspiration for late stage autophagy inhibitors"
1:00pm

Ilya Raskin, PhD
Distinguished Professor of Chemistry
School of Environmental & Biological Sciences
Rutgers University
"Health Effects of Phytochemicals from Foods"
2:20pm

Jason Reddick, PhD
Associate Professor
Biochemistry & Bioorganic Chemistry
University of North Carolina Greensboro
"Cracking the Biosynthetic Code of Deviant Polyketide Natural Products"
1:40pm

Jacob Hill, PhD
Postdoctoral Research Fellow
Program on Integrative Medicine
University of North Carolina Chapel Hill
"Current Challenges in the Clinical Application and Assessment of Natural Products for Cancer; A Global Perspective from Malawi to the United States"
3:15pm

Heather Zwickey, PhD
Professor of Immunology
Director of Helfgott Research Institute
National University of Natural Medicine
"Chew On This: A Collection of Nutrition Research Clinical Trials"
3:55pm

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Medicinal Natural Products Chemistry Research: From Lab to Clinic

A scientific symposium featuring leaders in the field of basic and clinical natural products research. Topics will include natural product biosynthesis, chemical ecology, and cancer drug discovery. This is a free event pitched to a general scientific audience, including students, faculty and community members.

Friday February 16th, 1:00 - 4:45pm | Kirkland Room
UNCG Elliott University Center (EUC)

For more info on MCsquared, visit mcsquared.uncg.edu

THE UNIVERSITY of NORTH CAROLINA
GREENSBORO
Department of Chemistry & Biochemistry

CREATING AND PERFORMING STORIES IN THE HUMANITIES AND SCIENCES

The National Humanities Center in partnership with UNC Greensboro Lloyd International Honors College and the Medicinal Chemistry Collaborative held this special event designed to inspire cross-disciplinary discussions. Panelists shared examples of how storytelling impacts their work as both humanists and scientists.

Creating and Performing Stories in the Humanities and Sciences

The National Humanities Center, in partnership with Lloyd International Honors College and the Medicinal Chemistry Collaborative at UNC Greensboro, is pleased to invite you to join this conversation on **Saturday, April 7, 2018 from 8:30am to 3:00pm at the NHC in Research Triangle Park, NC.** Designed to inspire cross-disciplinary discussions, panelists will share examples of how storytelling impacts their work as both humanists and scientists.

The humanities and sciences are often viewed as distinct and separate areas of inquiry. Yet whether we study history, chemistry, philosophy, or physics, our overarching methodology is similar in that it involves gathering data and constructing narratives - i.e. telling stories. A way of framing our overlap is by seeing the humanities and sciences as (1) guided by evidence, (2) subject to interpretation, and (3) open to revision. This one-day symposium is an opportunity for humanists and scientists to come together to explore our commonalities and learn from each other.

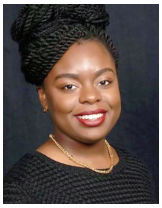
TO REGISTER: bit.ly/nhc-stories

Address: 7 T.W. Alexander Drive Research Triangle Park, NC 27709

Moderators

Omar Ali
Dean of Honors College, Professor of AADS and History, UNC-Greensboro

Nadja B. Cech
Patricia A. Sullivan Distinquished Professor of Chemistry, UNC-Greensboro



Domonique Edwards
Ph.D. Candidate, Human Development and Family Studies, UNC-Greensboro

Andy Mink
Vice President for Education Programs, National Humanities Center

Keynote

"Environmental Humanities: Where Do We Go From Here?" with Robert D. Newman, President and Director, National Humanities Center

Prior to becoming president and director of the National Humanities Center, Robert D. Newman served thirteen years as Dean of the College of Humanities at the University of Utah. Under his leadership, the college founded the Taft-Nicholson Center for Environmental Humanities Education and became the first university in the country to offer a graduate program in environmental humanities.

Science, History, and Storytelling

Stephanie Foote, Environmental Studies, West Virginia University - NHC Fellow 2017–18

Matthew Booker, Associate Professor of History, Director of Science, Technology and Society, North Carolina State University NHC Fellow 2016–17

Lindsay Caesar, National Institutes for Health Fellow, Ph.D. Candidate, UNCG Chemistry & Biochemistry

Aranzazu Lascurain, Assistant University Director, The Global Change Forum/SE Climate Science Center, North Carolina State University

Integrating the Sciences and Humanities from Pre-K to Ph.D.

Andromeda Crowell, Science Teacher, Orange County Schools

Elaine Franklin, Executive Director, Kenan Fellows Program, North Carolina State University

Domonique Edwards, Ph.D. Candidate, Human Development and Family Studies, University of North Carolina–Greensboro

Jamie Lathan, Dean of Distance Education, Humanities Department faculty, North Carolina School of Science and Math

NATIONAL HUMANITIES CENTER

LLOYD INTERNATIONAL HONORS COLLEGE
The University of North Carolina at Greensboro

MEDICINAL CHEMISTRY MC2 COLLABORATIVE

WINES & WINEMAKING: MERGING CHEMISTRY FUNDAMENTALS AND SENSORY OUTCOMES TO GAIN A 21ST CENTURY PERSPECTIVE

In this wine-centric event, participants explored principles of wine making and wines through sensory evaluations. Different flavor outcomes achieved in winemaking as a function of grape variety and the terroir differences of vineyards in California were illustrated. The approaches to wine creation were explored using case examples.

MEDICINAL CHEMISTRY MC2 COLLABORATIVE

The UNCG Medicinal Chemistry Collaborative (MCsquared) Presents:

"Wines & Winemaking - Merging Chemistry Fundamentals and Sensory Outcomes to Gain a 21st Century Perspective"

Friday, April 20th, 2018

Rioja! Wine Bar | 1603 Battleground Ave | GSO | 3:00 to 5:00pm

A workshop presented by

Professor Phil Crews
Department of Chemistry & Biochemistry
University of California at Santa Cruz

Abstract: Wine is a complex liquid comprised of many bioorganic and bioinorganic compounds in a 12.5% alcoholic solution with a pH range of 3-4. Wine quality assessment and winemaking methods have been in place for many centuries. Nowadays, contemporary approaches to winemaking are quite scientific as many aspects of this complex drink appear to be understood. For example, a book, "Wine Science Principles & Applications by Jackson, is now in its 3rd edition. Decades ago Wired Magazine reported on the *Grapes of Math* (GoM) in an comprehensive article to underscore that consulting companies exist to help winemakers craft award winning wines. The GoM approach uses databases created via metabolomics approaches. On the other hand, many subscribe to the idea that successful winemaking and wine quality evaluations can be achieved by just using a "right-brained" approach. In this wine-centric event we will explore principles of wine making and wines through sensory evaluations. Different flavor outcomes achieved in winemaking as a function of grape variety and the terroir differences of vineyards in California will be illustrated. The approaches to wine creation will be explored using case examples. Everyone in attendance will have a chance to dissect the major and minor complex flavors and aromas associated with wines and to correlate them with a few key biomolecules. Answers to vexing questions will be sought by examining outcomes derived from tasting and talking about five different Burgundy and Rhône style California wines.

A special Thank You to Rioja Wine Bar for agreeing to host this event!

POSTDOCTORAL HIGHLIGHT

Joshua Kellogg, Ph.D

Postdoctoral Researcher, Cech Group

> *"Coming from a number of other departments, what has struck me is the congenial and genuine interactions that go on. The collaborative nature of much of the work we do is a reflection of that."*

Dr. Josh Kellogg is the recent recipient of a National Institutes of Health Postdoctoral Research Fellowship for his project, *Complex Natural Product Mixtures Against Drug Resistant Infections: Targeting Multiple Pathways to Combat Bacteria.* He is the first postdoctoral researcher at UNC Greensboro to receive this type of NIH fellowship.

"I have worked with Drs. Cech and Oberlies at the UNCG Chemistry & Biochemistry Department for 3.5 years now, and it has been an incredibly rewarding experience, from many angles. Dr. Cech is not only a great chemist and scientist, but her attitude towards her lab, her students, and her school have helped shape my own identity and trajectory. She has shown the importance of networking, saying yes to opportunities and people whenever possible, staying positive, and being open to new collaborations, new ideas and new directions.

The department has been a tremendous resource and a great environment to do research. Coming from a number of other departments, what has struck me is the congenial and genuine interactions that go on. The collaborative nature of much of the work we do is a reflection of that. If I have a problem with our High Performance Liquid Chromotagraphy system, it's no bother to walk down to the Oberlies group and ask someone for their opinion. If we think that the project could benefit from modifications on a structure, a quick email to the Croatt group can spawn a whole new angle of research.

As a postdoc at UNCG, I have been helping drive our work as the Analytical Core on the Center of Excellence for Natural Product Drug-Interaction (NaPDI) Cooperative Agreement with the National Institutes of Health. This is a 9-million-dollar research grant that involves collaboration between scientists at four different universities, as well as the NIH itself. Our goal with this project is to evaluate the safety of dietary supplements such as green tea, goldenseal, and kratom that are widely used by consumers in the US. Our laboratory is responsible for characterizing the chemistry of these products and selecting appropriate material for use in human clinical trials.

I also work on multiple other projects. One that was started looking at the lichen Usnea ("old man's beard"), has transformed into the NIH fellowship that was just funded. This fellowship will enable me to undertake some more dedicated mentoring with our collaborator, Olav Kvalheim, at the University of Bergen in Norway. I plan to spend time at his lab next summer, and to visit him on the Bergen Fjords, which has been in his family since Viking times.

The fellowship is another stone in my path leading to, hopefully, a tenure-track position at a research-focused university. I am looking forward to starting this next chapter, though to be honest it will be hard to leave the department and all the wonderful folks at UNCG, as this has been a nurturing home and a period of incredibly productive and interesting research these past few years."

PREDOCTORAL HIGHLIGHT

Diana Kao

NIH Predoctoral Fellow, Oberlies Group

> *"I started out as an MS student in the Oberlies Lab. I enjoyed the atmosphere and the variety of the techniques and instrumentations I was afforded to learn and get hands on experience with in this lab and at this university. This is what prompted me to apply to the PhD Program. I didn't think I would get another chance like this one."*

Diana is a Ph.D student and National Institutes of Health F31 fellow. She investigates a class of compounds from a fungal endophyte that shows promise at inhibiting virulence in methicillin-resistant *Staphylococcus aureus* (MRSA).

"We all aim to do our fair share of caring for the lab whether cleaning, scheduling, or simply organizing. Sometimes, it is just about passing on your knowledge to someone else within the lab. We definitely ask each other for advice, and as a PhD student, you act as both student and mentor to your peers because we're all trying to navigate the unknown because we're doing cutting edge science.

As a Ph.D student, you really learn how to ask the right questions. There was no wrong question per se, but an underlying curiosity to elucidate the why and how gives an individual the motivation each day. The road is not really clear cut from start to finish, but it is about learning from new results and improving your technique. This is the process of learning and adapting. In this program, there is a focus on fostering that sort of environment to make you feel comfortable to make the mistakes and 'learn to learn.'

I have had the fortune of being able to devote most of my time to research as a National Institute of Health (NIH) fellow. The NIH provides resources for those that are interested in independent research such as those found at school institutions. I was invited to Bethesda, Maryland, in October of 2017 to the National Center for Complementary and Integrative Health. They were very generous in funding my trip there, and those invited were able to receive tours of the facility while they helped us navigate the process of receiving funding from choosing the right grant to actually writing it and then advice on revising it.

The funding granted to me by the NIH, awards from the graduate school and sometimes even Dr. Oberlies himself has afforded me a number of opportunities to go to travel to a number of conferences. This allowed me to present my research to both broad and specific fields as well as become aware of the diversity of scientific research. Not only are there other students, post doctorates, and professors there but also individuals from national and industrial labs to educate me about the array of chemistry applications. Many perform research and analysis as is often the conventional idea of a scientist, mad or otherwise. Chemists help develop everything from absorbance of baby diapers to patent law. This has certainly broadened my perspective.

I have found that I prefer the more structured setting of industry to the high flexibility setting of independent research. I do not strive for a specific occupation, and perhaps that part of me is highly flexible. I enjoy the opportunity to collaborate with my fellow scientists and build towards specific goals. UNCG and the Oberlies Lab have filled my toolbox with numerous techniques. I want to use and expand upon them to contribute to improving our way of life either in health or basic necessities of our everyday."

UNDERGRADUATE HIGHLIGHT

Nadjali Chung

Alumna, Cech Group

> *"My involvement in the honors college helped to keep me grounded by being a constant reminder that science and scientists are a small part of the world we live in—without creatives, businesspeople, teachers, philosophers, and others to inspire and encourage us, many of my friends and I would not have been as successful as we are now."*

Nadjali is a second-year graduate student in the Department of Chemistry at Vanderbilt University doing mass spectrometry research with Drs. Renã Robinson and John McLean.

"I could go on for a while about my UNCG experience and everything and everyone who impacted me and shaped my four years there. The biggest influencers, though, would have to be doing research with Dr. Cech and her research group, which helped me grow personally and professionally, being a part of the Honors College, and a living-learning community I was a part of my freshman year.

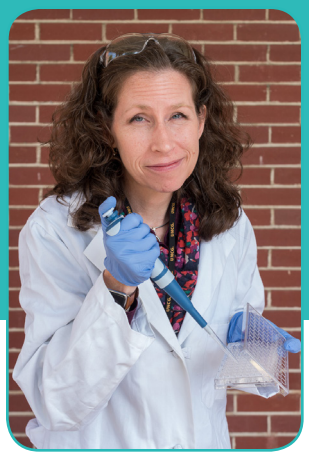
The learning community, AToMS, brought together a lot of the freshmen who declared STEM majors (chemistry/biochemistry, physics, math, and computer science were the most represented, I think). We lived together for the first year and took our general chemistry and math classes together. We were also required to keep logs of university-hosted events we went to and we had to meet a certain number of hours per semester. At the time, it seemed like we were being forced to do these things, but the payoff was actually not bad because that really encouraged us to find people outside of the community who had similar interests as us beyond our majors. That community fostered my interest in physics and math, which helped me figure out what areas of chemistry were most interesting to me.

The two years I spent in Dr. Cech's lab helped me to grow in a number of ways: it's from her and the group that I learned how to speak up and share my science in a way that is easy to understand; and everyone in the group has inspired me to be the best researcher that I could be and that has carried over into my graduate studies. I'm most thankful that I was able to experience some degree of independence in the lab as an undergraduate. The honesty I got in the lab, in meetings, and in the department in general, as well as the support I received, was probably the best part of my last two years.

At UNCG I was also a part of the Lloyd International Honors College. My involvement with the Honors College helped to keep me grounded by being a constant reminder that science and scientists are a small part of the world we live in—without creatives, businesspeople, teachers, philosophers, and others to inspire and encourage us, many of my friends and I would not have been as successful as we are now. I was encouraged to think about facets of society and my life in ways that felt abstract, and that helped me—and has continued to help me—relate more to other people.

After graduate school, I'd like to revisit sustainable chemistry, maybe have that be the focus of my postdoctoral work/studies. I'm also really interested in working in research and development at an instrumentation company for mass spectrometers or hybrid ion mobility-mass spectrometers for use in clinically or environmentally relevant areas of study."

RESEARCH HIGHLIGHT



Dr. Sherri McFarland and Dr. Colin Cameron

McFarland Group

McFarland and her collaborators have developed a light-responsive bladder cancer drug that is now in human clinical trials with Theralase Technologies. They're also collaborating with the company to develop drugs to treat glioblastoma, a type of brain cancer.

Drs. McFarland and Cameron have founded a company - Photodynamic Inc - based on light-responsive natural products that can eliminate oral biofilms, which are associated with cavities and gum disease. They've also licensed a light-responsive bladder cancer drug to another company; that treatment is now in human trials.

The McFarland Group researches photo dynamic therapy, which is the use of light to activate theraputic compounds in the body. Currently McFarland is moving in the direction of nanophoto medicine.

One of the challenges with some photodynamic applications, McFarland says, is that not all wavelengths of light are equally effective. Sometimes, the frequencies that penetrate tissues the best don't carry enough energy to activate light-sensitive, therapeutic compounds to attack cancers.

But some types of nanoparticles - very tiny particles with specific chemical structures - can "up-convert" the light, absorbing a lower-energy photon and then emitting a high-energy photon. That new, high-energy light has enough energy to activate the therapeutic compound.

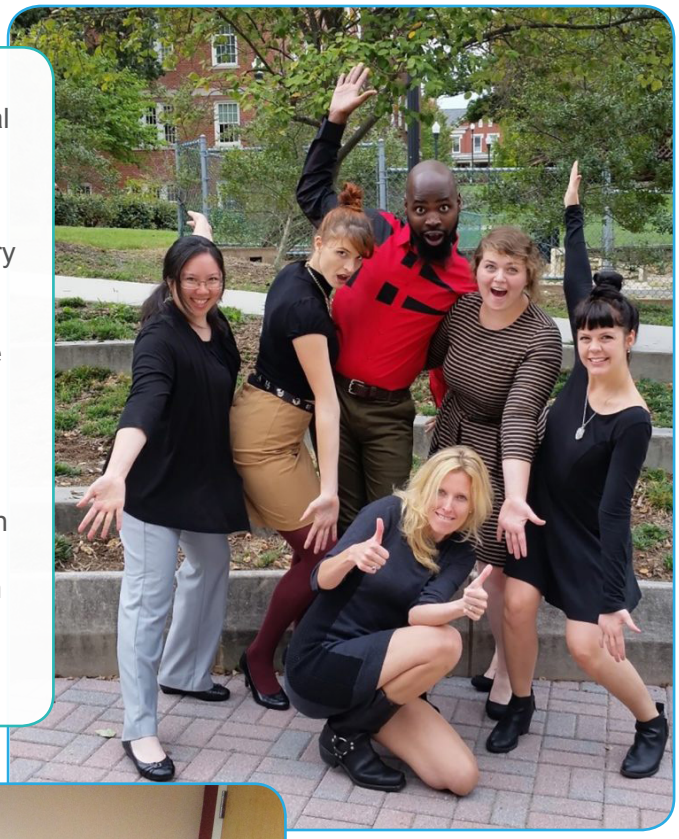
"The idea is we could then treat larger tumor volumes," McFarland says. By combining light-therapeutic compounds with these nanoparticles, doctors could potentially treat tissues deeper in the body, where longer-wavelength light can penetrate and then be converted to shorter wavelengths to activate the drug.

"You start out with a lot of different combinations of individual molecules and nanoparticles and then you whittle those down to the top performing, according to whatever screening procedure you're using," McFarland says.

Combinations that work successfully in the lab will go on to further testing. They could also form the basis of new companies that could be spun out of McFarland's lab.

Visit the UNC Greensboro Research Magazine website researchmagazine.uncg.edu/mc2 to read the full MCsquared article, which covers other key research s cientists in our group as well.

GRADUATE FELLOWS



NIH PREDOCTORAL TRAINING PROGRAM
Our National Institutes of Health funded "Predoctoral Training: Innovative Technologies for Natural Products and CAM" is one of only two institutional predoctoral training awards (T32) in basic science supported by the National Center for Complementary and Integrative Health nationwide. Situated within the Medicinal Chemistry Collaborative, this program supports four Ph.D students enrolled in the Department of Chemistry and Biochemistry at UNC Greensboro. An additional two trainees are funded by individual (F31) National Institutes of Health predoctoral fellowship grants. The NIH fellowship program prepares trainees for independent research careers with a combination of mentored laboratory research, scientific coursework, seminars, hands on training and internships. You can find more details about this program at the website mcsquared.uncg.edu/NIH-fellowships.

WRITE TIME, WRITE PLACE
An example of our commitment to supporting the progress and professionalization of our graduate fellows is the establishment this year of a MCsquared fellows writing group. The group meets every week to write publications and grant proposals. Dedicated time and space lets the group concentrate on their writing in a supportive atmosphere.

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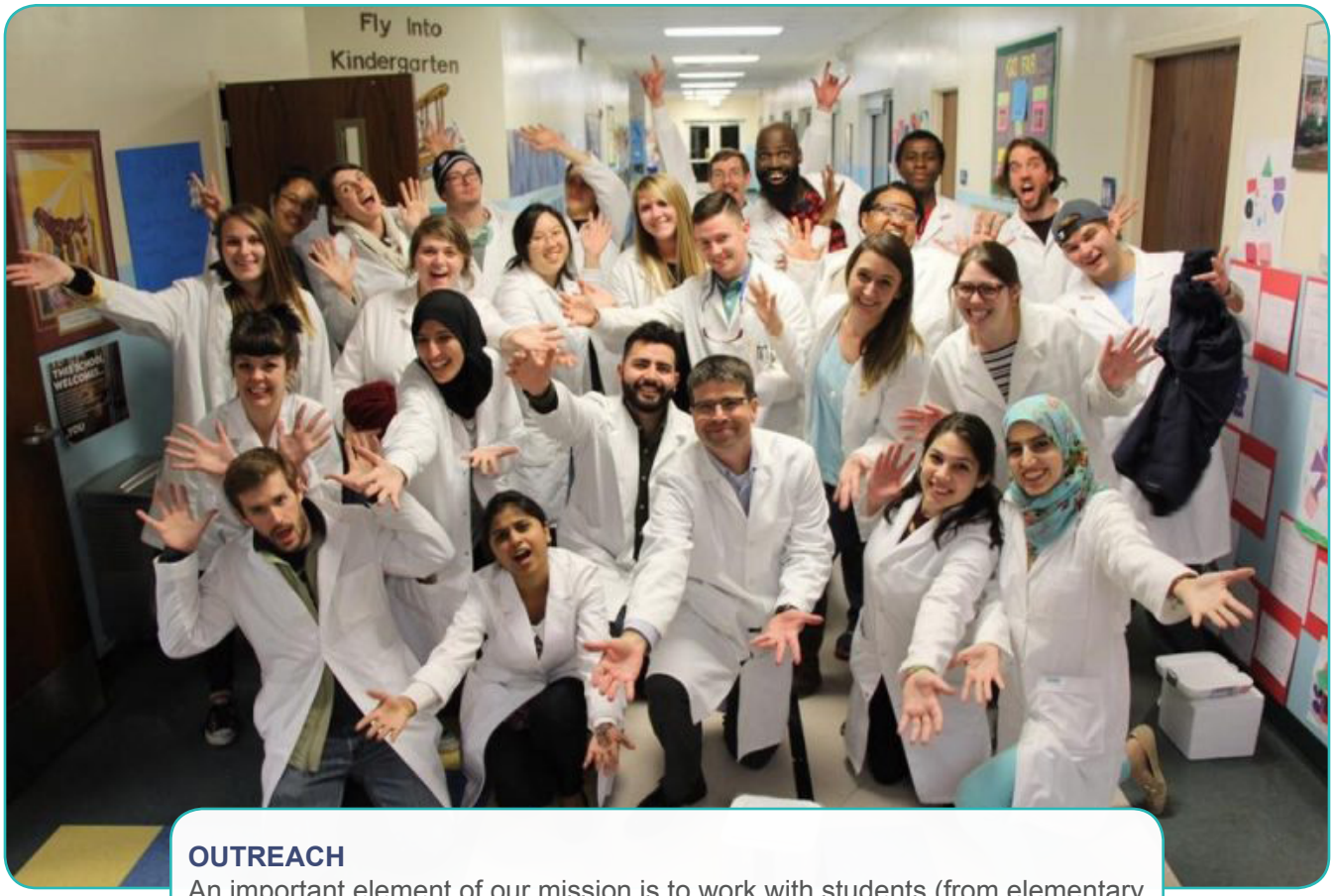
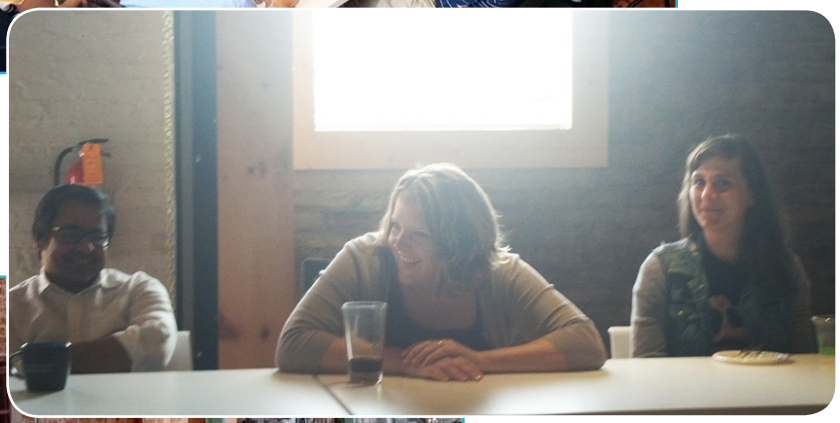


OUTREACH

An important element of our mission is to work with students (from elementary school through college) and community partners to ignite interest in science. In this photo, scientists and graduate students from the Medicinal Chemistry Collaborative and the UNC Greensboro Department of Chemistry and Biochemistry pose after leading one of their Science Night events at Lindley Elementary School, a public school in Guilford County. This annual event is collaboratively organized by students and parent volunteers. K-5th graders and their families perform fun and safe experiments with “real-life scientists”.

MEET AND SHARE

An important aspect of the Medicinal Chemistry Collaborative is our regular gatherings, which usually take place at the Greensboro HQ coworking space in downtown. Members of MCsquared come together and update one another on activities and news and socialize in a casual, fun environment. We also invite either a member of MCsquared or an outside guest to present on their work, with plenty of discussion afterward. These talks facilitate open discussion and exchange.



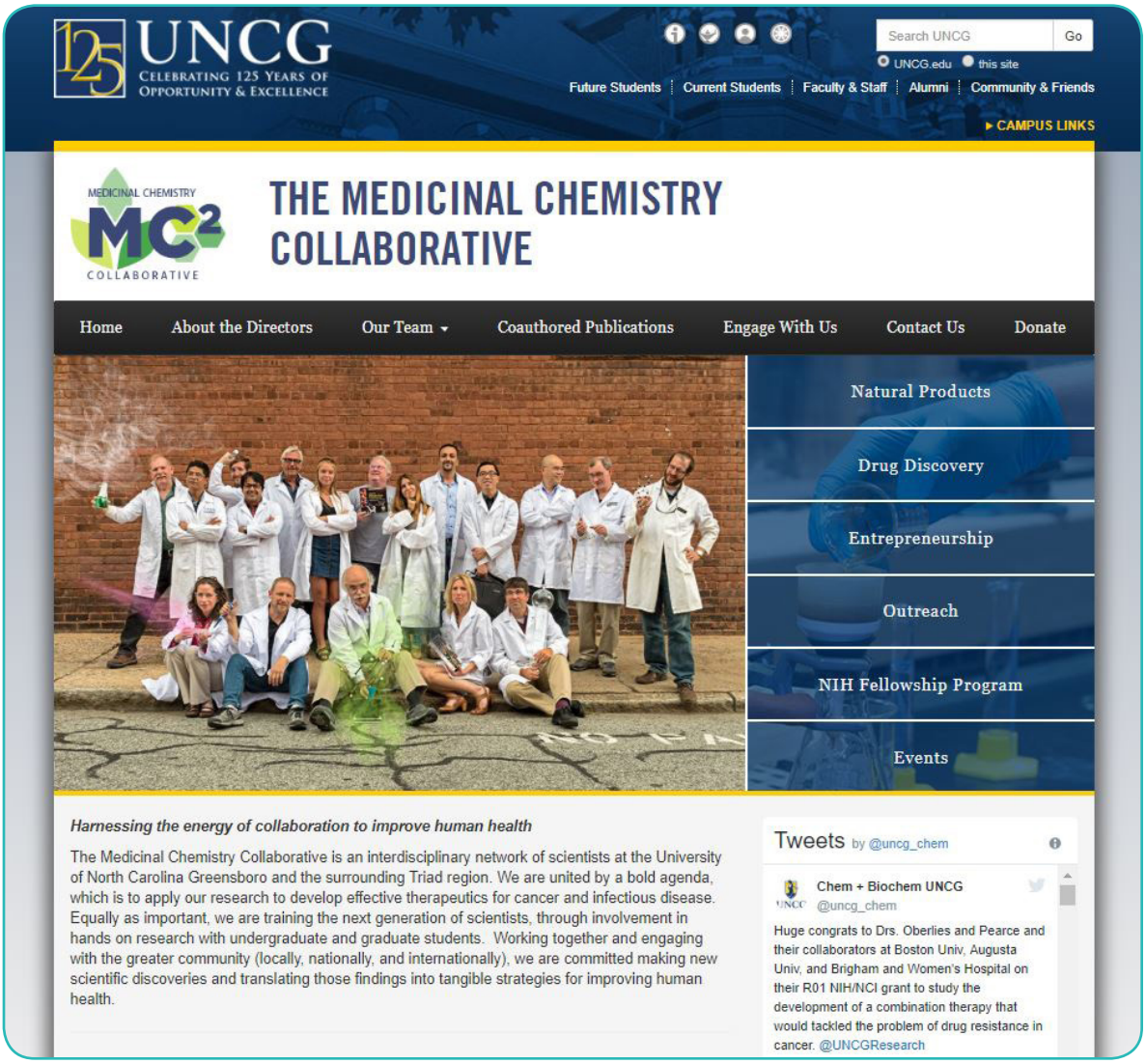
MEDICINAL CHEMISTRY

MC²

COLLABORATIVE

NEW WEBSITE, NAME AND LOGO

Part of our MCsquared branding initiative during the past year involved launching the new website mcsquared.uncg.edu, establishing a new logo and officially establishing the name of Medicinal Chemistry Collaborative (MCsquared for short!). Many thanks to all who helped with these efforts.



GET TO KNOW US

RESEARCH FACULTY SPOTLIGHTS

In an effort to hightlight our amazing MCsquared faculty and the work they are doing, we coordinated the production of a small series of video spotlights. We worked with UNC Greensboro Associate Professor Michael Frierson's Media Studies production class to produce the videos, which gave the undergraduate students that worked on it professional experience and material for their portfolios. In addition to the videos below, you can find these spotlight videos on our department YouTube Channel: http://bit.ly/mcsquared-spotlights

Cech Research Group

McFarland Research Group

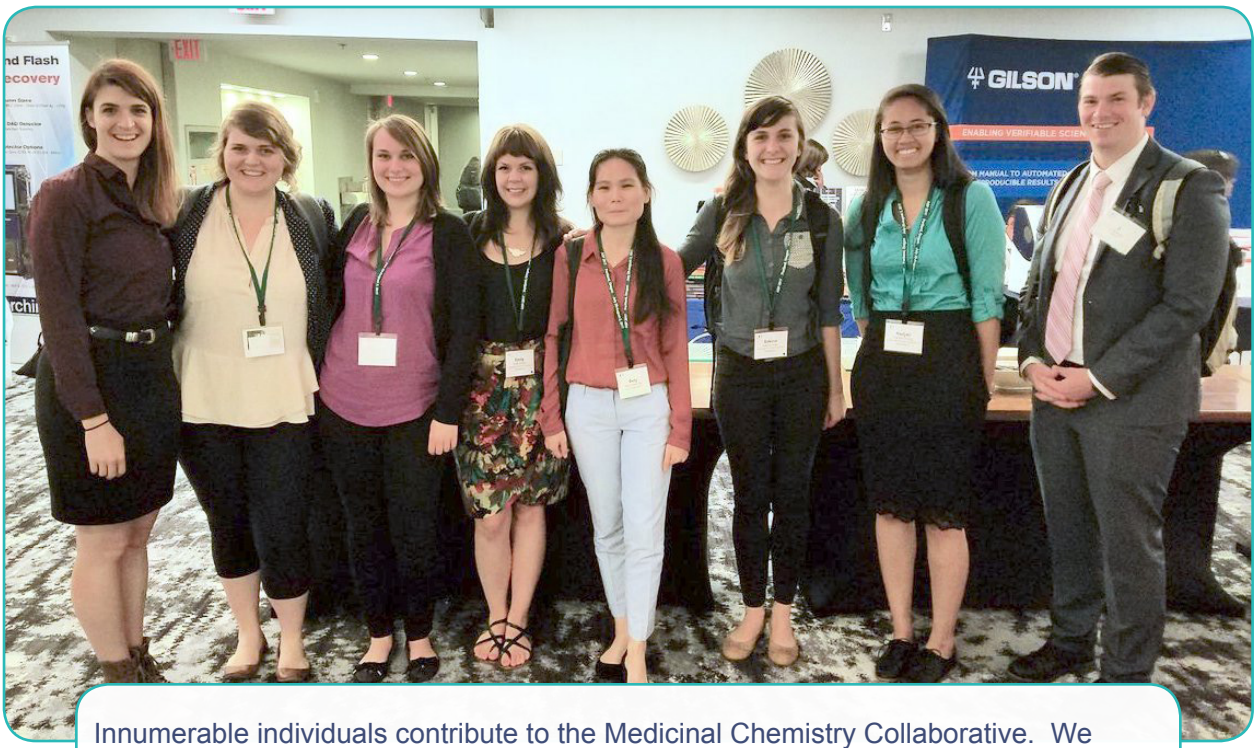
Oberlies Research Group

Petersen Research Group

NEW PROGRAM COORDINATOR

As part of the effort this year to coordinate communications, events and programming, we created a new Program Coordinator position and hired Matt Bryant for the role. Matt assists with all things MCsquared, including website creation and maintenance, social media, events coordination and support, predoctoral training program training support, grant submission support and special projects. His academic background is in communications and fine art.

THANK YOU



Innumerable individuals contribute to the Medicinal Chemistry Collaborative. We are especially grateful for the support of UNC Greensboro administrators Chancellor Franklin Gilliam, Vice Chancellor Terri Shelton, Provost Dana Dunn, Dean John Kiss, Dean Omar Ali, Dean James Ryan and Interim Dean Joseph Graves. Thanks also to all those who contributed their creativity and expertise by speaking at our events and symposia this year, including Joanna Burdette, Lindsay Caesar, Phil Crews, Domonique Edwards, Tamam El Elimat, Jacob Hill, Robert Huigens, Sherri McFarland, Andy Mink, Cassandra Quave, Ilya Raskin, Jason Reddick and Heather Zwickey. A huge thanks also to all of our members and affiliates who participated in these events. Many individuals across campus continually help to coordinate and organize events, including Rachel Agner, Ann Ashby, Angela Boseman, Matt Bryant, Delight Morehead, Simone Parker, Trina Porcher, Sangeetha Shivaji, and Aubrey Turner. Nothing we do would be possible without you. Our research and training activities are made possible largely with support from research grants, which come from diverse sources including the National Institutes of Health, the National Science Foundation and the North Carolina Biotechnology Center. Finally, we are particularly grateful to the late Chancellor Patricia A. Sullivan. Dr. Sullivan's endowment is critical to the research and training activities conducted under the MC Squared umbrella. Her legacy as a champion of education and educators, particularly in the sciences, lives on.