North Carolina Academy of Science
Since 1902

**Volume 4, Issue 4**

**April 2016**

# Reflections on the NCAS Annual Meeting

*Report by: Dr. Martin Kang, Duke University*

*Dr. Martin Kang*

The 113th Annual North Carolina Academy of Science was a meeting full of first experiences for me. It was my first NCAS meeting, my first time at Methodist University, and my first time judging oral presentations. It's not common that postdocs are judges at conferences, but my name was forwarded to the NCAS committee by Guilford's Dr. Melanie-Lee Brown, my mentor from the Preparing Future Faculty program. I was grateful to be a part of this wonderful experience.

With a thunderstorm forecast, but never materializing, I made the drive from Durham into Fayetteville on Friday evening for the start of NCAS. Like a lot of schools in North Carolina, Methodist University is a picturesque campus that made an idyllic setting for this year's conference. Having just been built, this was the first official event to take place in Methodist's Thomas R McLean Health Sciences Building and you could tell, as everything was shiny and new.

For many students, NCAS will be their first experience presenting their own work to peers and faculty from different institutions. Receiving positive feedback or winning an award can validate months and years of lab and field work, and perhaps motivate someone to pursue a scientific career. My impressions from the first day of NCAS were that some of the data generated was shockingly advanced for undergraduates, collectively the students were fantastic presenters, and it was excruciating picking the winner from my category. I judged one or two people on Friday night that have the potential to become good if not great scientists.

The next day, after an early wake-up, I drove back out to Fayetteville for the second day of the conference. Getting up early on weekends is not my favorite pastime, but I was curious to see if the oral session could match the bar set by the poster presentations from the previous night. The topics ranged from generating novel drug screens using *C. elegans*, prostate cancer, genetic modifications using CRISPR, apoptosis, to disinfecting endospores. Like Friday, I thought the students were excellent speakers across the board, and at times I would have to remind myself that they were still undergraduates.

On Saturday we also had the privilege of listening to this year's keynote speaker, Dr. Francis de los Reyes III from NC State. The theme of this year's NCAS meeting was 'It isn't easy being green, is it?' and his talk on 'The Global Sanitation Crisis' was thought-provoking. I would recommend anyone with the opportunity to listen to Dr. Reyes to do so.

I find intimate meetings like NCAS with a healthy interaction between students and faculty to be the best ones. They increase the confidence of students in their scientific abilities, and allow for immediate feedback from faculty members. My first NCAS experience was truly memorable.

*What's going on in the North Carolina Academy of Science:*

- Annual Meeting Reflections
- Bryden and Derieux Award Winners
- Featured Scientist—Dr. Carlos Goller
- Photos from the Annual Meeting

***Inside this issue:***

# Overview of the NCAS 2016 Annual Meeting

*Report by: Dr. Clay Britton, Local Arrangements Committee Chair, Methodist University*

The 2016 Annual Meeting of the NCAS was held on April 1-2 at Methodist University in Fayetteville. This year's meeting was dedicated to Dr. Charles F. Lytle (1932-2015), who was a long-time supporter of NCAS, maintaining a relationship with the Academy for more than 40 years. Charlie's family accepted his Honorary Life Membership Award during Friday evening's events.

We had great participation with this year's event; there were nearly 60 posters Friday night and almost 50 oral presentations on Saturday, with 259 total guests in attendance for the weekend. Our sponsors and exhibitors that helped ensure that the event was a success included Biomerieux, North Carolina Biotechnology Center, Rho, Entomopixel, and Wake Forest Innovation Quarter.

The theme for the meeting "It Isn't Easy Being Green, or is It: A S.T.E.M.-Based Approach to What it Means to be Green" was exemplified by Saturday's keynote speaker. Thank you to Dr. Francis de los Reyes, who explored the interdisciplinary challenge of going green in sustainability, blending engineering, environmental science and economics to propose a four-step solution for global sanitation. We also had two workshops to help prepare students for "the next step". Drs. Claire Gordy and Carlos Goller led a session on "How to Apply to Graduate School" while Ms. Sara Lane worked with students on "How to Move Your Application to the Top of the Pile".

The 113th Annual Meeting was a great success. Methodist University was honored to host the NCAS. Thank you to all of the speakers and attendees. The Academy looks forward to seeing everyone at the 2017 Annual Meeting being hosted by High Point University.

# Bryden Awards

*Report by: Dr. Lei Zhang and Dr. Mark McCallum*

Lei Zhang, Chair of the Bryden Grants Committee, reports the following proposals will receive Bryden Grant funding:

**Daniel Lough, Wake Forest University** (Advisor: Dr. Miles Silman) for his project entitled "*Using a Novel Technique to Monitor Secondary Seed Dispersal within the High Diversity of Manu National Park, Peru*."

**Sarah Schimpp, UNC Greensboro** (Advisor: Dr. Matina Kalconuis-Ruppell) for her project entitled "*Determining Species-Specific Nightly Bat Activity in Sites with Varying Urban Density*."

Halley Shah's project at UNC Greensboro received Honorable Mention. The work was titled "Molecular Studies of Air Pollutant benzo(a)pyrene-1.6-guinone-Induced Endothelial Dysfunction: Implications in Chemical Atherogenesis." (Advisor: Dr. Zhenguan Jia)

**Congratulations to Daniel, Sarah, and Halley on this honor!**

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# Annual Meeting Photos

*Photo Credit to: Andy Steele*


**Thanks to our meeting photographer, Andy Steele!**

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## Thank You Judges & Moderators!

This year's annual meeting boasted fantastic array of student presentations, including outstanding posters and oral presentations. Every year, volunteer judges with expertise in a variety of fields share of their time to provide valuable feedback to student presenters. These judges take their jobs very seriously, and deliberate carefully on award winners. Moderators create a professional environment for the oral presenters to showcase their hard work and results. Without these volunteers, the annual meeting would not be a success! Thank you all for what you do for our CANCAS presenters.

The NC Academy of Science would like to thank our Institutional Members:

*Methodist University*
*Elon University*
*Campbell University*
*UNC at Greensboro*
*Lenoir-Rhyne University*
*UNC at Pembroke*
*Warren Wilson College*

We appreciate your support!

# Featured Scientist: Dr. Carlos Goller

*Report by: Dr. Jessica McCann, Duke University*

**In this issue of "meet the scientist," we are talking teaching strategies with Dr. Carlos Goller, Teaching Assistant Professor for the Biotechnology Program in the Department of Biological Sciences at NC State.**

*Dr. Carlos Goller with his wife, Dr. Claire Gordy, and their daughter. Photo credit: Dinah Jean Whistler.*

After growing up in Mexico, Dr. Carlos Goller achieved his PdD studying the genetics that regulate bacterial biofilms with Dr. Tony Romeo at Emory University in Atlanta. Dr. Goller then did his first postdoc in the department of Pediatrics/Infectious disease at Duke University medical center studying new antimicrobials against bacteria that cause urinary tract infections. He then put his bacterial genetics and technology knowledge to work in a postdoc focused on teacher training at NC State in the biotechnology program. This opportunity has translated into a full time teaching professor position at NC State. We asked him to talk about the courses he teaches, his strategies behind course design, and how he keeps students engaged while effectively transferring his academic knowledge to his students.

Dr. Goller directs and contributes lectures to at least 3 courses during the academic year. He told us first about a semester-long molecular biology course during which students clone a gene, express that gene in bacteria and purify the resulting protein product. In this course, Dr. Goller has incorporated learning through doing, using restriction enzymes, cloning, transformation, and screening for phenotypes via antibiotic resistance to reinforce concepts in bacterial genetics. The course culminates in the purification of an GST-tagged protein (in this case a protein that leads to fluorescent bacteria). At the end of the semester, the students have gone through a real life example of what many scientific researchers do at the bench, both in academia and industry.

Dr. Goller is focused on keeping his students up to date on the cutting edge of biotechnology. "The lecture component covers key concepts and emerging technologies such as genome editing with CRISPR and the use of next-gen sequencing." This course is designed for juniors and seniors, but also includes first and second year graduate students from biological sciences, chemical engineering, the vet school, and a variety of graduate programs. So Dr. Goller can employ the useful strategy of pairing graduate and undergraduate students together in the lab portion of the course. This helps ease students through the technically and academically challenging content.

In an inquiry based 8-week course, Dr. Goller can guide students through real life examples of research in action. "This means that we essentially get to learn as a class by analyzing unknown samples or mutants." These modules are great examples of how Dr. Goller keeps his courses fresh and modern, as two modules focus on hot topics in biotechnology: metagenomics, or the study of populations of microorganisms using DNA-based identification without culture; and yeast metabolic engineering, where students introduce foreign genes into yeast so that the microorganism now has the entire pathway to make, for example, the essential nutrient beta carotene.

One additional class Dr. Goller teaches is bioethics. In this course, he covers basics of responsible conduct in research (RCR), a topic that is far too often overlooked in many undergraduate and graduate science curricula. The class then discusses modern biotechnologies and their ethical implications.

Not satisfied to sit on his syllabi, Dr. Goller is currently designing a course on robotics and high-throughput screening and sequencing. The class will use robotics to analyze multiple samples or conditions to learn more about a specific microbe. Using these technologies, Dr. Goller hopes "to emphasize the power of automation in analyzing large numbers of samples and/or conditions and how we can now use these machines to try to answer questions about the biology of organisms and to discover potential therapeutics."

We asked Dr. Goller how his involvement in NCAS has impacted his teaching. He told us that, "Every time I attend [the annual meeting], I learn about neat undergraduate research projects and try to think how I can include some of that knowledge in my courses. The speakers bring new perspectives. For example, Dr. Francis de los Reyes made me think about water sanitation and how I can and should give the screening class a water-sanitation focus."

Finally, when asked about his overall strategies he uses to keep students engaged, he relayed these examples: "presenting authentic research experiences or questions, having them *do* the learning in groups, and, most importantly, trying to convey the energy of discovery."

# CANCAS Derieux Award Winners

*Report by: Dr. Beth Overman, Methodist University*

| Category | Award | Name | Institution | Title |
|---|---|---|---|---|
| Botany & Zoology | 3rd Place | **Krystal LaFlora** & Eric Butler | Shaw University | A Novel System for Correlating Bee Activity with Temperature |
| | 3rd Place | **Shaliek Morgan**, DeAnna Beasley, & Mary Jane | Shaw University | The Role of Temperature in Immune Function and Behavior of Ants |
| | 2nd Place | **Natavia Ray** | Shaw University | Urban Conditions Suppress Melanin-Based Immunity in Ants (*Camponotus castenaus*) |
| | 2nd Place | **Samantha Killoran** & Zachary Privette | Nash Community College | Phylogeography of the Three-Lined Salamander: Unexpected levels of Genetic Homogeneity Across the Sotheastern United States. |
| | 1st Place | **Zoe Flowers** | Meredith College | Biodiversity Survey of Parasites in Freshwater Fishes |
| Human Biology & Microbiology | 3rd Place | **Caleb Stubbs** | UNC Pembroke | Investigating Mutant Suppressor of Synthetic Lethality between htz1D and RPB2-2SL in *Saccharomyces cerevisae* |
| | 3rd Place | **Maisoon Qassem** | Campbell University | Comparison of the Human Apolipoprotein Alleles to Zebrafish Homologs to Identify Alzheimer's Associated Protein Isoforms |
| | 2nd Place | **Lauren Askew** | UNC Chapel Hill | New Autophagy Regulators: Utilization of a Novel Autophagy Assay to Screen Components of the Mating Response Pathway |
| | 1st Place | **Dylan Millwoon** | Lenoir-Rhyne University | Diversity of Endophytic Fungi in Leaves of *Juglandaceae* and *Aceraceae* |
| Molecular Genetics | 3rd Place | **Ismael Gomez** | Nash Community College | Diversification of Seepage Salamanders (*Desmognathus aeneus*) as Revealed through Mitochondrial and Nuclear Sequence Data |
| | 2nd Place | **David Creasman** & Karen Guzman | Campbell University | Investigating the Interactions of SR-A, TLR3, and TLR4 Receptors and the Impact on Cytokine Production in Mouse Monocytes |
| | 1st Place | **Arushi Wadhwa** | NC State University | Structural Characterization of the Phytosulfokine Receptor Kinase (PSKR-2) |
| Chemical & Physical Sciences & Science Education | 3rd Place | **Kiara Whitaker** | North Carolina A&T University | The Effect of Life Coaching and Supplemental Instruction on Test Anxiety |
| | 3rd Place | **Sharon Ayioka,** Tessa Calhoun, & Kevin Higgins | UNC Pembroke | Carotenoids and Their Effect on Small Molecule Transport across Membranes |
| | 2nd Place | **Hannah Clause, Brittany Bowers,** & Sarah Goforth | Campbell University | Synthesis of Substituted Pyridines via Cyclization of Methyl Ketones with Ammonium Acetate in DMSO |
| | 1st Place | **Jacob Cleary,** Ashley Williams, Scott Jones, Demetrious Lewis, David Stewart, Nyqueisha Thomas & Parke Rublee | UNC Greensboro | Metal Tolerance of Bacteria Isolated from Coal Ash |

# CANCAS Derieux Award Winners

*Report by: Dr. Beth Overman, Methodist University*

| Category | Award | Name | Institution | Title |
|---|---|---|---|---|
| Ecology & Environmental Science | 3rd Place | **Ryan Siebens** | Guilford College | Differences in Aggression between Species and Sexes of Lemur |
| | 2nd Place | **Armin Weise,** Joseph Apodaca, & Todd Elliot | Warren Wilson College | Sampling for Fungal Associates of the Myco-heterotroph *Monotropsis odorata* (Ericaceae) in Western North Carolina |
| | 1st Place | **Byron Hamilton** | Guilford College | What's an Old Book Good For: Testing an Ayurvedic Cure for Acne |
| Microbiology | 3rd Place | **Emily Esterwood** & Karen Katula | UNG Greensboro | Apoptosis in HCT-116 Cells Specific to WNT5A Isoform A and Isoform B Proteins |
| | 2nd Place | **John Falls** | Lenoir-Rhyne University | Disinfection of *Bacillus subtilis* Endospores utilizing Aqueous Ozone and Sodium Hypochlorite |
| | 2nd Place | **Tiffany Ramos** & Daniel Stoval | North Carolina Wesleyan | Effects of SOX17 Depletion on Prostate Cancer Cell Invasion |
| | 1st Place | **Karishma Patel** | North Carolina Wesleyan | Regulation of SOX17 in Prostate Cancer |
| Health Science & Molecular Biology | 3rd Place | **Amber Reed &** Melanie Lee-Brown | Guilford College | Effects of Rhamnolipids of Biofilms Found in Nosocomial Environments |
| | 3rd Place | **Marc Muraski** | Guilford College | Study of the *Mycoplasma penetrans* Aminotransferase Domain |
| | 2nd Place | **Amber Wasler** | Lenoir-Rhyne University | The Effects of Dietary b-D-Glucan on the Intestinal Microbiota of Mice (*Mus musculus*) |
| | 1st Place | **Virginia Pszczolkowski**, Rusty Bryant | Warren Wilson College | Effects of Spent Craft Brewer's Yeast on Ruminant Methane and Ammonia Production |
| Zoology, Chemistry, & Physical Science | 3rd Place | **Austin Casey,** Steve Cartier, Dana Emmert & Langdon Martin | Warren Wilson College | Peptide Synthesis: A Renewable Method |
| | 2nd Place | **Paschence** Johnson | Lenoir-Rhyne University | Effect of Caffeine and Adenosine on California Black Worm *Lumbriculus variegatus* |
| | 2nd Place | **Cierra Prencipe**, Mark Brenner, Robert Hastings & Paul Bartles | Warren Wilson College | Duckweed as a Potential Source of Protein-Rich Feed Supplement for Broiler Chickens at the Warren Wilson College Farm |
| | 1st Place | **Alexandra Barbour**, Jessica Tutterow, Christine Stracey & Melanie Lee-Brown | Guilford College | Microbiota of Eastern Bluebird Nestling Fecal Sacs |

North Carolina Academy of Science
Since 1902

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The **objective** of the North Carolina Academy of Science is to *"encourage the advancement of science within the state of North Carolina by promotion of scientific research and by the fostering of education in the sciences*". The North Carolina Academy of Science meets these objectives by...

- Publishing a peer reviewed scholarly journal, the *Journal of the North Carolina Academy of Science*.
- Fostering and encouraging student involvement in the sciences through support of the Collegiate (CANCAS) and Student Academies (NCSAS).
- Promoting interactions among scientists and students throughout North Carolina.
- Providing a forum for exchange of ideas for solving issues important to North Carolina.

The Academy members include individuals from academia, industry, government, and all others who support the objectives and goals of the Academy.

## North Carolina Academy of Science

**Our Mission**

The North Carolina Academy of Science promotes public appreciation of science, science education, scientific research and a meaningful role for science in public policy.

**Our Goals:**

**Promote public appreciation of science**

- Partnership with Science Centers
- Public Lecture Series
- Newsletter

**Promote science education**

- NCAS Webpage
- Academic Lecture Series
- NCAS Publications: Journal, Educational Publications
- Student Academy - Middle & High School

**Promote scientific research**

- Yarbrough and Bryden Research Grants
- CANCAS Undergraduate Research Workshop
- Presentation Opportunities at Annual Meetings
- Journal of the North Carolina Academy of Science

**Promote science in public policy**

- Symposia
- News Releases
- Position Statements
- Interactions with Public Officials