



North Carolina Academy of Science

112TH ANNUAL MEETING

Innovation in Research

MARCH 27-28, 2015

North Carolina
Academy
of Science
Since 1902

HOSTED BY:

 Wake Forest™
**innovation
quarter**



WAKE FOREST
UNIVERSITY

GRADUATE SCHOOL of
ARTS & SCIENCES

The Office of Postdoctoral Affairs



Welcome

from the NCAS 2015
Local Arrangements Committee

The academic institutions of Winston-Salem, including Wake Forest School of Medicine, Wake Forest University, Winston-Salem State University, Salem College and Forsyth Technical Community College, welcome you for a weekend of science networking. We thank the entire staff of Wake Forest Innovation Quarter for providing this wonderful venue for the 2015 Annual Meeting. The speakers selected by the Local Arrangements Committee emphasize the theme of "Innovation in Research," any of whom might open doors for your future endeavors! Members of the Wake Forest University Postdoctoral Association Teaching Affinity Group as well as undergraduate student organizations have volunteered to help the program to run smoothly. We all need to thank the members of the NCAS Board of Directors for their contributions to the annual meeting, and their continued efforts to maintain the Academy of Science as well as the Collegiate and the Student Academies. A very special "thank you" goes to program assistants Ifeoma Onwurah and Sandra Kabler, who worked with the registration, fundraising and general program management, and Matthew Clark for volunteering to serve as the meeting photographer. We also need to thank our various sponsors, whose logos appear in this program, for their monetary contributions which significantly subsidize the costs of the Annual Meeting. All these people and organizations have dedicated their time and effort to providing you the opportunity to share your science with others. Please take the time to interact with the other participants at the NCAS meeting. And then, take your science home to share with your local communities and your circle of friends and family!

Allyn Howlett
Chair, Local Arrangements Committee

2015 Local Arrangements Committee Members

Rebecca Alexander
Steven Fordahl
Mark Furth
Jill Keith

Tracy Porter
Gloria Muday
Bita Nickkholgh
Ifeoma Onwurah

Wayne Pratt
Stephen Rego
Lei Zhang

NCAS President's Welcome



I would like to thank Wake Forest Biotech Place for hosting us this year. It is a wonderful facility and attendees should make sure that they take the time to look around the facility, the Innovation Quarter and Winston-Salem. The tireless volunteers who have made this meeting possible have my thanks. We couldn't do it without you (Thanks Team Allyn!). The North Carolina Academy of Science held its first organizational meeting on March 21, 1902, and has been a supporter of science in North Carolina ever since! Our mission is to promote public appreciation of science, science education, scientific research and a meaningful role for science in public policy. Every year we gather to learn and discuss science topics from a broad range of topics, showcase the talents of the next generation of scientists, promote new collaborations and renew old friendships. The broad range of topics allows us to explore the diversity that is science. We live in a time of science specialization. Gone are the days of the natural scientists and philosophers who explored diverse topics on a wandering journey led

by their interest and curiosity. But the scientific curiosity is still here. That curiosity is what drove many of us to become scientists, and the annual meeting of the North Carolina Academy of Science is one of the venues where we can still engage that wandering scientific curiosity that extends well beyond our specialized fields. I encourage everyone to take some time to learn something new. The theme of this year's meeting is "Innovation in Research," and we will have Christian Felder and Jennifer Elisseeff as Plenary and Keynote speakers. I'm looking forward to hearing about some of their innovations!

A handwritten signature in black ink, appearing to read "J Fuller".

James Fuller
2014–2015 NCAS President

Welcome to Wake Forest Innovation Quarter

It is an honor and a pleasure to serve as the site for the 112th annual meeting of the North Carolina Academy of Science—especially since the focus of this year’s gathering is “Innovation in Research.”

The facility in which your functions are taking place, Wake Forest Biotech Place, and the neighboring buildings are inspirational manifestations of the type of innovative thinking that we cherish and foster here. After many decades as industrial plants for R.J. Reynolds Tobacco Co., these buildings had been abandoned and fell into disrepair. But where some could see only blight, others saw opportunity, including R.J. Reynolds itself, which gifted these buildings to Wake Forest Baptist Medical Center several years ago. Despite many challenges, renovation and revitalization of these hulking icons of Winston-Salem’s industrial past by Wake Forest Baptist Medical Center in partnership with Wexford Science & Technology and the City of Winston-Salem and Forsyth County, has transformed an urban wasteland into a dynamic hub of academic, educational and commercial enterprise and a shining symbol of this city’s future.

Science and research—especially in biomedicine, information technology and advanced materials—are central to many of the activities that take place here. But they are not pursued in isolation. Rather, collaboration is one of the foundations of the Innovation Quarter. From the very start, we have endeavored to create an environment conducive to interaction, to the open exchange of ideas, to the creation of a knowledge-based community that is diverse in discipline but singular in attitude.

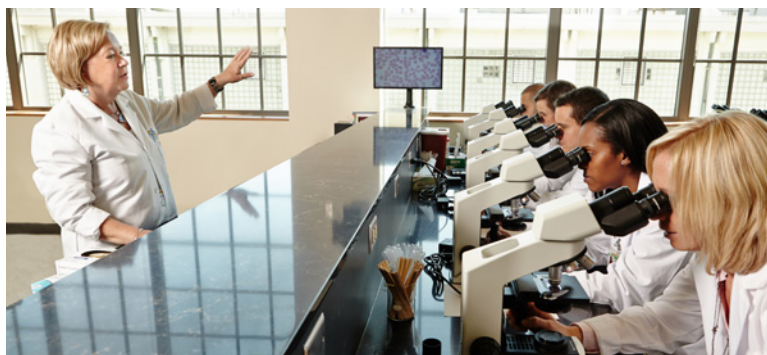
It’s most fitting, then, that you’ve come here to share your findings, your experiences and your insights with your colleagues in the advancement of science from around the state.

On behalf of your local hosts —Wake Forest School of Medicine, Wake Forest University, Winston-Salem State University, Salem College and Forsyth Technical Community College, I extend best wishes for a productive meeting, and hope you find the setting as energizing as we do.

Regards,



Eric Tomlinson, D.Sc., Ph.D.
President, Wake Forest Innovation Quarter
Chief Innovation Officer, Wake Forest Baptist Medical Center



Wake Forest Innovation Quarter

Wake Forest Innovation Quarter is a fast-growing hub for innovation in biomedicine science, information technology and advanced materials.

Located on 145 acres in the heart of Winston-Salem, North Carolina, the Innovation Quarter provides a distinctive urban setting for a dynamic, knowledge-based community where science, technology, education and commerce converge and connect.

The Innovation Quarter's tenants—from large, well-established anchors including Wake Forest Baptist Medical Center, Inmar and Wells Fargo, to numerous promising start-ups including Carolina Liquid Chemistries, Clinical Ink and KeraNetics—occupy first-class laboratory and innovation space in expertly renovated historic structures and newly constructed buildings.

The creative designs of these workplaces and their common areas create an atmosphere conducive to casual contact, formal interaction and meaningful collaboration among the Innovation Quarter's rapidly growing population of researchers, professionals, entrepreneurs and students. The immediate proximity of modern living accommodations, amenities and services that promote a harmony between work and life make the Innovation Quarter a neighborhood in the truest sense.

With more than 3,000 professionals working in over 75 companies and academic departments and entities, and with many new projects underway, the Innovation Quarter is a beacon for innovation and a driver of economic development.



Learn more at InnovationQuarter.com
Phone: +1.336.716.8672
email: innovationquarter@wakehealth.edu





Schedule at a Glance

Friday, March 27, Wake Forest Biotech Place

1–2 pm	Finance and Strategic Planning Committee Meetings Room 153A/B
2–5 pm	Board of Directors' Meeting Room 155A/B
5–6 pm	Registration and Poster Setup Biotech Place Atrium
5:30–6:30 pm	Poster Judges' Meeting Room 351 (3rd floor)
6–7:30 pm	Poster Session and Reception Atrium
7:45 pm	Welcome Remarks and Plenary Address Auditorium and Atrium Welcome Remarks Dr. Allyn Howlett, Local Arrangements Committee Chair Dr. James Fuller, 2014-15 President of NCAS Chad Campbell, Wake Forest Innovations
8:30–9:30 pm	Plenary Lecture: Dr. Christian Felder, Eli Lilly and Co., <i>"Recent Advances in Drug Discovery: Importance of Academic-Industrial Partnerships"</i>
9:45–11:45 pm	CANCAS Social (organized by Salem College and WFU URECA students)

Saturday, March 28, Wake Forest Biotech Place

7:30–8:15 am	Oral Session Judges' Meeting Room 351
7:30–8:15 am	Session Moderators' Meeting Room 153A/B
7:30–8:30 am	Setup of Exhibitor and Vendor Tables Atrium
8 am	Setup of Student Academy (NCSAS) Posters Atrium NCSAS Hospitality Room 154
8 am	Registration and Oral Presentation Setup Presentation Preview Room 152 and Room 156
8:30–4 pm	Exhibits of Sponsors and Vendors Atrium
8:30–1:30 pm	Student Academy Posters Viewing Atrium
9:15–10:15 am	Student Academy Posters Manned Atrium
8:45–10 am	Oral Sessions A, B, C, D Auditorium, 153A/B, 155A/B, 157

Schedule at a Glance

10–10:15 am	Break
10:15–10:30 am	Welcome Remarks Dr. Allyn Howlett, Local Arrangements Committee Chair Dr. James Fuller, President of NCAS
10:30–11:30 am	Keynote Address Dr. Jennifer Elisseeff, Johns Hopkins University <i>“Regenerative Biomaterials for Tissue Reconstruction”</i>
11:45 am–12:30 pm	Oral Sessions E, F, G, H Auditorium, 153A/B, 155A/B, 157
12:30–1:15 pm	Box Lunches Lunches may be eaten in the Atrium, 153A/B, 155A/B or in the outdoor area south of the building.
1–2 pm	Oral Presentation Judges' Meeting Room 351
2–3 pm	Concurrent Special Sessions Auditorium, 153A/B, 155A/B, 157
3–3:10 pm	Cookies and Coffee Break Atrium
3:10–3:55 pm	Oral Sessions I, J, K, L
4–5 pm	Concurrent Workshops Auditorium, 153A/B, 155A/B, 157
5–5:30 pm	CANCAS Officers' Award Preparation Meeting Room 154
5:10–6 pm	NCAS Business Meeting* Auditorium
5:10–6 pm	CANCAS Business Meeting* (155A&B)
5:45–6:30 pm	Social Gathering and Musical Interlude Atrium
6:30–8:30 pm	Banquet and Awards Ceremony Atrium
8:30–9 pm	Board of Directors' Meeting 155A/B

* Everyone is eligible to participate in the business meetings. All participants are considered members of the NCAS or CASCAS because membership is included in the registration for those who were previously non-members.

Friday Schedule

Poster Session and Reception

Friday 6 pm–7:30 pm, Biotech Place Atrium

Immunology, Microbiology & Molecular Biology

1. Heather Colvin*^o, Michelle Thomas and Sharon Mason. Campbell University. **Characterization of Bacterial Fluoroquinolone Resistance in Swine.**
2. Mesha Guinyard*^o, Kenyon Jones*^o, Ebony Stadler, Sherese Mann*, Maleek Richardson, Sarina Veale, Derrick Azorlibu*, Yannick Tuwamo*, Kalynn Hosea*, D. Alex Page*, Kelsie M. Bernot* and Robert H. Newman,* North Carolina A&T State University. **BACTO-ART: A Multicomponent Inducible Expression System for Teaching and Discovery.**
3. Edem Tchegnon*^o, John McCormick*^o, Humaira Bibi*^o, Zhenquan Jia, University of North Carolina at Greensboro. **Inhibition of Peroxynitrite-mediated DNA Strand Damage by Acetyl- L- Carnitine: Implications for its Neuroprotective Action.**
4. Cheryl Manner*^o, Carl Manner, Jonathan Nelson and Karen S. Katula, UNC Greensboro. **WNT5A Isoform A and Isoform B Differentially Affect Cell Migration in the Human Colon Carcinoma Cell Line HCT-116.**
5. Annapurna Hanumanthu^o and Mary Beth Hawkins, North Carolina State University. **Mutation of a Single Ligand Binding Domain Amino Acid of the Teleost Estrogen Receptor Beta a Increases Its Binding Affinity to DES.**
6. R. Blair Childs*^o and Dr. Yashomati Patel, University of North Carolina, Greensboro. **The Role of Myosin IIA on GLUT4 Vesicular Tethering at the Plasma Membrane in 3T3-L1 Adipocytes.**
7. Cary Mundell^o, Aaron Byrd. Sarah N. Champion, Amy Bataille, Jose E. Manautou, Ben A. Bahr, University of North Carolina, Pembroke. **Analysis of GST Specific Activity in Aged Mice Treated with PADK.**
8. Sara McEwan^o, Heather Romine, Vidyanand G. Shukla, Spyridon P. Nikas, Alexandros Makriyannis and Ben A. Bahr, University of North Carolina, Pembroke. **Testing Endocannabinoid Enhancement for Protection Against Paraoxon-induced Oxidative Damage and Corresponding Synaptic Decline in Rats.**
9. Autumn Bass*^o, David Guzman, Karen Guzman, Campbell University. **A Simplified Method to Create Transgenic Zebrafish Using Electroporation.**
10. Jamie E. Garner^o, Dr. Michelle Thomas, Campbell University. **Insecticide Tolerant Bacteria.**
11. Hannah Itell*^o, Shannon Doherty, Jon Lim, Kathryn Smith, Laurie J. Heyer and A. Malcolm Campbell, Kelly E. Cochran, Michael J. Quaney, Jeffrey L. Poet, Todd T. Eckdahl, Davidson College and Missouri Western State University. **Designing, Constructing and Testing New Ammeline Riboswitches.**
12. Kathryn Smith*^o, Laurie J. Heyer and A. Malcolm Campbell, Davidson College. **Developing Negative Selection Conditions to Find Better Riboswitches.**
13. Shannon Doherty*^o, Laurie J. Heyer and A. Malcolm Campbell, Davidson College. **Shifting Programmed Evolution from Plates to Broth.**

*member of the CASCAS (collegiate) academy \ ^opresenter

Friday Schedule

14. Morgan L. Barnes*^o, Sharidan J. Hill*^o, Cameron R. Howell*^o, Najla J. Kawas*^o, Emily A. Linton*^o, Julianne N. Osborne*^o, Prathna Raval*^o, Nehemiah E. Allen*^o, Sarah J. Bizzell*^o, Nicole M. Griffin*^o, Julianne H. Nance*^o, Morgan R. Packer*^o, Travis Rhea*^o, Sarah D. Ryals*^o, Karen Guzman, Campbell University. ***Physical and Computer Modeling of Biological Macromolecules Involved in Nuclear Protein Transport to Improve Understanding of Protein Structure and Function.***
15. Ranabhat, R., McClendon, C.J., Sousa e Silva, A.A., Pettiford, S.G., Conklin, D.R. and Waterman, J.T, North Carolina Agricultural and Technical State University. ***Swine Production Systems Cause Differential Expression of Superoxide Dismutase in Tracheobronchial Tissues of Pigs.***
16. Ashley McDermott*^o and Taek You, Campbell University. ***Identification of Microorganisms Carried by Pets for Possible Health Risk Assessment.***

Behavioral & Health Sciences, Cell Development

17. Kayla Gudac^o, Hali Calcutt, Stephanie Walker, University of Mount Olive. ***The Impact of Classroom Behavior on Academic Performance.***
18. Steven Greco*^o, Alexis McNeil*, Stephanie Walker, Emilee Kohler, University of Mount Olive. ***The Effects of Captivity on Gaur Bos Gaurus in a Public Setting.***
19. Aiperi Iusupova^o and Kayo Robinson, Guilford College and University of North Carolina at Greensboro. ***Montagnard Refugee Health Behavior: Cortisol-related Hypertension and Psychosomatic Morbidity.***
20. Eanes, Lauren A^o, Yashomati M. Patel, University of North Carolina at Greensboro. ***M.S. Analysis of Molecular Target(s) of Naringenin in MCF-7.***
21. Morgan Pait^o, Lyndsie Elliott, Sarah Ruiz, Heather Romine, JodiAnne Wood, Alexandros Makriyannis, and Ben A. Bahr, University of North Carolina at Pembroke. ***Further Development of Z-Phe-Ala-diazomethylketone (PADK) for Alzheimer's Disease: Oral Dosing Increases Active Cathepsin B in Brain Without Causing Adverse Effects.***
22. Adele Price*^o and Michele Malotky, Guilford College. ***Development of a Pathogenic Assay to Test Potential Novel Antibiotics in Caenorhabditis Elegans.***
23. Emily Esterwood*^o, Lynn Luu*, Karen Katula, University of North Carolina at Greensboro. ***Do the WNT5A Isoforms A and B have Different Effects on Apoptosis and Senescence in HCT-116 Cells?***
24. Dailian Silverio*^o, Yashomati Patel, University of North Carolina at Greensboro. ***Identification of Proteins Involved in Glut4 Mediated Glucose Uptake.***
25. Justin Branch*^o and Ben A. Bahr, University of North Carolina Pembroke. ***Testing Whether the Lysosomal Modulator Padk is Involved in the Lysosome-To-Nucleus Pathway that Promotes Longevity.***
26. Aleena McDaniel^o, Andrew R. Kusmierczyk, North Carolina Agricultural and Technical State University. ***Mechanism of Assembly of 20S Proteasome.***
27. Jill J. Keith^o and Tennille D. Presley, Winston-Salem State University and Wake Forest School of Medicine. ***Integrative Learning: A Model for Student and Faculty Development.***

*member of the CASCAS (collegiate) academy \ ^opresenter

Friday Schedule

Biotechnology, Chemistry, Physics & Engineering, Genetics & Genomics

28. Sabrina Williams[°], William Williams and Taek You*, Campbell University. **Utilizing Molecular Biology Computer Software "Case It" in Molecular Biology Experiments.**
29. Caleb Stubbs*[°], Maria Santisteban, University of North Carolina at Pembroke. **Investigating Cryptic Initiation Between Synthetic Lethal Mutants Htz1Δ and RPB2-2SL in Saccharomyces Cerevisiae.**
30. Ismael Gomez*[°], C. Kabryn Mattison*[°], David A. Beamer, Nash Community College. **The Distribution of mtDNA Haplotypes Associated With An Ancient Hybridization Event.**
31. Taylor Ibelli*[°], Nicole Levi-Polyachenko, Christie Young, Elizabeth Graham, Sean Reid, Weedley Funeus, Wake Forest University. **Photothermal Ablation of Streptococcus pyogenes Using Fluorescent Bio-Polymer Nanoparticles.**
32. Stephen Amoah*[°], Justin Schwartz, Lenoir-Rhyne University and North Carolina State University. **Electrical Processing Of Thoria Pellets.**
33. Tala Khatib[°], Hannah Lineberry, Heather Stevenson, Arnold S. Bayer, Michael R. Yeaman and Antje Pokorny, University of North Carolina at Wilmington. **Binding Of Daptomycin To Lipid Bilayers Is Not Significantly Altered By The Inclusion Of Lysyl-Phosphatidylglycerol.**
34. Katie Mcdaniel*[°], Anastassja Davis Mcneil* and Lei Zhang, Winston-Salem State University. **Cuo Nanowires Thermal Synthesized With Different Cu Surface Roughness.**
35. Tracey Pu[°], Dr. Benjamin S. Harrison, Wake Forest Institute for Regenerative Medicine. **Effect of L-Glutathione on Oxygen Generating Profile of Sodium Percarbonate.**
36. Slivinski, Juliano[°], Tyler Graf[°], Nicholas H. Oberlies[°], University of North Carolina at Greensboro. **Isolation and Purification of Compounds from Silybum marianum.**
37. Morgan Packer*[°], Nathan Reed*, Taek You, Greg Buhrman and Robert Rose, Campbell University and North Carolina State University. **Binding Studies of Human Insulin Transcription Factors Pdx1 and MafA on the Promoter.**
38. *Withdrawn*
39. Philna Joubert[°], Zhenquan Jia, University of North Carolina at Greensboro. **Toxicity of Benzo[A]Pyrene 1,6-Quinone in Smooth Muscle Cells: Role of Reactive Oxygen Species and Mitochondria Complexes.**
40. Nicholas A. Lentini[°], Elizabeth D. Blue, Campbell University. **Synthesis and Characterization of 1H-[1,4]dithiino[2,3-d]imidazole.**
41. Halley Shah[°], Philna Joubert, Humaria Bibi, Rojin Chitrakar and Zhenquan Jia, University of North Carolina at Greensboro. **Production of Reactive Oxygen Species (ROS) by Benzo-[A]-Pyrene Quinone 3,6 in Endothelial Cells.**

Ecology, Environmental Sciences & Zoology

42. Angela Lenard*[°], Amanda Williard, University of North Carolina at Wilmington. **The Effect of Water Temperature on Lactate Accumulation in Exercising Yellow-bellied Slider Turtles (Trachemys scripta).**
43. Benjamin S. Humphrey*[°] and David Campbell, Gardner-Webb University. **A Survey of Phylum Mollusca in the Broad River Greenway, Boiling Springs, N.C.**

*member of the CASCAS (collegiate) academy \ [°]presenter

Friday Schedule

44. Clayton L. Lynch^{*°}, Ismael Gomez^{*}, Corey Stamper^{*} and David A. Beamer, Nash Community College. ***Phylogeography of the Neuse River Waterdog.***
45. Judith Mesko^{*°}, Ismael Gomez^{*} and David A. Beamer, Nash Community College. ***Phylogeography of Seepage Salamanders.***
46. Brad Smout[°], Warren Wilson College. ***Oyster Mushroom (P. ostreatus) Mycelium Filter for Treatment of Water Contaminants: TSS and Atrazine.***
47. Mycah Sewell^{*°}, Haylee A. Trotter^{*} and Lisa Kelly, University of North Carolina at Pembroke. ***Colony Social Forms of Invasive Fire Ants (Solenopsis invicta) in Wetlands of North Carolina.***
48. Elizabeth Brown, Hugh Smith[°], Joshua York, Bruce Harrison and Carmony Hartwig, Catawba College and Western Carolina University. ***Morphological and Molecular Identification of Mosquito Diversity in the Fred Stanback Jr. Ecological Preserve at Salisbury, North Carolina.***
49. Sean Taylor[°], Mary Jane Carmichael^{*}, Joseph White^{*}, William Smith^{*}, Wake Forest University. ***Effect of Increased Salinity Exposure on Leaf Tissue And Water Status in Taxodium Distichum (Bald Cypress) Seedlings.***
50. Haylee A. Trotter^{*°}, ^{*}Mycah Sewell^{*} and Lisa Kelly, University of North Carolina at Pembroke. ***Does Colony Social Form of Invasive Fire Ants (Solenopsis invicta) Affect Microhabitat Choice in Wetlands of North Carolina?***
51. Sharon Mason, John Bartlett and Paige F. Phillips[°], Campbell University. ***A Frightening Future Without Honey Bees; What Will We Do?***
52. Christopher W. Bolick^{*°} and Jay F. Bolin, Catawba College. ***Hybrid Intermediacy in Ashe's Sumac (Rhus Ashei) a Hybrid of the Federally Endangered Michaux's Sumac (Rhus Michauxii) and Common Smooth Sumac (Rhus Glabra).***
53. Ashley Mckenzie[°], University of North Carolina at Wilmington. ***Stable Isotope and Mercury Analysis of Adélie Penguin Tissues from Antarctica.***
54. Amanda Schmitt^{*} & Joseph Oyugi[°], Gardner-Webb University. ***The Habitat Preferences of Six-lined Racerunners (Cnemidophorus sexlineatus) at Broad River Greenway, NC.***
55. Rojin Chitrakar[°], Zhenquan Jia, University of North Carolina at Greensboro. ***Studies of Environmental Pollutant Acrolein-induced Endothelial Cell Death and Dysfunction.***
56. Christine Baran^{*°}, Miranda Beam, Pfeiffer University. ***Analyzing Pharmaceuticals in Water Samples Using Solid Phase Microextraction GC/MS.***

Plenary Address

Friday, Biotech Place Auditorium and Atrium

7:45–8:30 pm

Welcome Remarks

Dr. Allyn Howlett, Local Arrangements Committee Chair
Dr. James Fuller, 2014-15 President of NCAS
Chad Campbell, Wake Forest Innovations

8:30–9:30 pm

Plenary Address

Dr. Christian C. Felder, Eli Lilly and Co.
“Recent Advances in Drug Discovery: Importance of Academic-Industrial Partnerships”

^{*}member of the CASCAS (collegiate) academy \ [°]presenter

Saturday Schedule

Saturday Morning, Oral Sessions A–D

8:45–10 am

Oral Session A: Auditorium

Immunology, Microbiology, Cell Development Biology and Chemistry

- 8:45–9 am Lori Roberts[°] and Melanie Lee- Brown, Guilford College. ***Antimicrobial Activity of Goldenseal (*Hydrastis Canadensis*) Against Opportunistic, Potentially Pathogenic Bacteria.***
- 9–9:15 am Brittany Coursen[°], Lenoir-Rhyne University. ***The Effect of Sodium Dodecyl Sulfate (Sds) on the Regenerative Properties Found in Lumbriculus Variegatus (California Blackworms).***
- 9:15–9:30 am Layth M. Awartani[°], Christine M. Stracey, Melanie J. Lee-Brown, Guilford College. ***A Survey of the Bacterial Microflora Present in the Feces of 9-day-old Loggerhead Shrike (*Lanius ludovicianus*) Nestlings.***
- 9:30–9:45 am Brian Liechti[°], Laura Lengnick, Jeff Holmes and John Brock, Warren Wilson College. ***The Effect of Cattle Grazing on Soil Carbon Evolution.***
- 9:45–10 am Maggie Stanley[°], Dr. W Lin Coker, Campbell University. ***Comparison Of Different Titration Procedures For Vitamin C Analysis.***

Oral Session B: Room 153A/B

Genetics and Molecular Biology

- 8:45–9 am Alexandra Barbour*[°], Erik Johnson, Guilford College and Wake Forest University. ***Exploring Corazonin Receptor Expression in the Fruit Fly and its Relevance to Human Fertility.***
- 9–9:15 am Marcus D. Sherman*[°] and Conner I Sandefur, University of North Carolina at Pembroke. ***Differential Genomic Profiling of *Solenopsis Invicta* Buren Subtypes Via Gene Counter-Regulation and Functional Annotation.***
- 9:15–9:30 am Pettiford Sg*[°], Ranabhat R., Sousa e Silva AA, McClendon CJ, Conklin DR , Hurley SL and Waterman JT, North Carolina Agricultural and Technical State University. ***Swine Production Style Influences Histological Morphology, Proteomic Dynamics and Superoxide Dismutase Expression in the Tracheal Epithelium.***
- 9:30–9:45 am C. Kabryn Mattison*[°] and David A. Beamer, Nash Community College. ***Past, Present, Future: Hybridization Between Two Dusky Salamander Lineages.***

Oral Session C: Room 155A/B

Ecology

- 8:45–9 am Caitlin Rubow*[°], Lenoir-Rhyne University. ***Distances Flown to Foraging Sites by *Ardea Alba*, the Great Egret, During the Breeding Season.***
- 9–9:15 am Paul Frye*[°] and Constance Lowery, Catawba College. ***The Effects of Increased Levels of CO₂ on Photosynthesis and Respiration of *Favia fragum*.***

*member of the CASCAS (collegiate) academy \ [°]presenter

Saturday Schedule

9:15–9:30 am Kyle Henderson*° and J. Bolin. Catawba College. **Non-lethal Predator Avoidance by Aquatic Beetles to The Red Swamp Crayfish (*Procambarus Clarkii*).**

9:30–9:45 am Elizabeth Alden Pryor*°, Guilford College. **The Nassau Grouper, *Epinephelus striatus*: A Key Species Inside and Outside Marine Protected Areas.**

Oral Session D: Room 157 & 152

Health and Behavioral Sciences

8:45–9 am Lesley Manuh*°, Guilford College. **Antimalarial Care During Pregnancy in West Africa, Ghana.**

9–9:15 am Sam Anderson*°, Lenoir-Rhyne University. **Muscle Fatigue: Its Effect On Force And Motor Unit Recruitment in Forearm Muscles.**

9:15–9:30 am Marie Mauhar*°, Lenoir-Rhyne University. **Differences in Anatomical Proportions of Collegiate Athletes.**

9:30–9:45 am Kunga Denzongpa*°, Sudha Shreeniwas and Melanie-Lee Brown. Guilford College and UNC, Greensboro. **Myths vs. Facts: Prenatal Health Care Awareness In Sikkim, India.**

North Carolina Student Academy of Science (NCSAS) District Winners Poster Presentation

9:15–10:15 am Biotech Place Atrium
Robert Fisher, Aniket Palkar, Tejal Patwardhan, Sunny Potharaju, Stephanie Powell, Llanía Abella

Keynote Presentation

Saturday, Biotech Place Auditorium and Atrium

10:15–10:30 am **Welcome Remarks**
Dr. Allyn Howlett, Local Arrangements Committee Chair
Dr. James Fuller, President of NCAS

10:30–11:30 am **Keynote Address**
Dr. Jennifer Elisseeff, Johns Hopkins University
“Regenerative Biomaterials for Tissue Reconstruction”

Saturday Morning Oral Sessions E–H

11:45 am–12:30 pm

Oral Session E: Auditorium

Immunology, Microbiology, Cell Developmental Biology and Chemistry

11:45–Noon Alan-Michael Bresch*°, Lenoir-Rhyne University. **The Effect of Titanium Dioxide on Phagocytosis, Exocytosis, and Contractile Vacuole Function of *Tetrahymena Thermophila*.**

*member of the CASCAS (collegiate) academy \ °presenter

Saturday Schedule

Noon–12:15 pm Mark Healey*^o, Elizabeth D. Blue, Campbell University. **Exploring the Role of N-methylimidazole in the Mechanism of Copper(I)/TEMPO-catalyzed Aerobic Oxidation of Primary Alcohols.**

12:15–12:30 pm Marc Muraski*^o, Daniel Christen and Melanie Lee-Brown, Guilford College. **Pseudomonas Aeruginosa Biofilm Disruption Via Yayurea A&B Quorum Quenching.**

Oral Session F: Room 153A/B

Genetics and Molecular Biology

11:45–Noon Pasangi Perera*^o, Delaney Williams*^o and Michele Malotky, Guilford College, **Epigenetic Changes Associated with Nicotine-related Products and Effects on Addictiveness to Other Substances.**

Noon–12:15 pm Lauren M. Doolittle*^o and Gloria K. Muday, Wake Forest University. **Elucidating The Arf7 Transcription Factor Network That Controls Lateral Root Formation in Arabidopsis.**

12:15–12:30 pm Kathleen T. Dinapoli*^o, Gregory S. Maloney, Gloria K. Muday, Wake Forest University. **Tomato Mutants and Introgression Lines Provide Evidence for a Role of Flavonoids in Lateral Root Development.**

Oral Session G: Room 155A/B

Ecology

11:45–Noon Finn Furstenwerth*^o, Taylor Spillman*, Duncan Cameron, Jay Bolin, Catawba College, University of Sheffield, UK. **Is the Southern Blue Thread (*Burmammia capitata*) partially mycoheterotrophic?**

Noon–12:15 pm Jimmie Teague*^o, Gideon Wasserberg*, University of North Carolina at Greensboro. **The Oviposition of *Aedes albopictus* in Response to Copepoda in Field Conditions.**

12:15–12:30 pm Benjamin S. Robb*^o, Wake Forest University. **Effects of Fungal Endophyte on Antagonistic Modulation of SA and JA Pathways.**

Oral Session H: Room 157 and 152

Health and Behavioral Sciences

11:45–Noon Carlisha A. Hall*^o and John H. Roe, University of North Carolina at Pembroke. **Overwintering Behavior of Eastern Box Turtles (*Terrapene c. carolina*) in a Fire-managed Ecosystem.**

Noon–12:15 Sheridan Boyle*^o, Robert Eckstein, Jessa Madowsky, and Alisa Hove, Warren Wilson College. **Allogrooming and Agonism: Understanding the Social Behavior of Indian Cattle and Water Buffalo.**

12:15–12:30 pm Deanna Moquin*^o and Michele Malotky, Guilford College. **Wise Worms: Effects Of *Ginkgo Biloba* on Learning and Memory in *Caenorhabditis Elegans*.**

*member of the CASCAS (collegiate) academy \ °presenter

Saturday Schedule

Special Sessions

Saturday Afternoon 2–3 pm

The Center for Nanotechnology and Molecular Materials at Wake Forest University

David Carroll, Auditorium

Outstanding in the Field: Syngenta's Innovations in Biology and Chemistry Help to Feed a Growing World

Kent Kabler, Room 153A/B

Biosciences Talent Required: National Center Biotechnology Workforce and BioNetwork

Russ Read, Room 155A/B

The Center for Design Innovation: Pamela Jennings, Room 157 & 152

Oral Sessions I–L

Saturday Afternoon 3:10–3:55 pm

Oral Session I: Auditorium

Ecology and Environmental Science

- 3:10–3:25 pm Elliott Millinor*^o, Lenoir-Rhyne University. ***Herpetofaunal Biodiversity and Ecological Monitory of Lotic Systems in Riverbend Park.***
- 3:25–3:40 pm Joseph C White^o and William K Smith, Wake Forest University. ***Water-source Partitioning of Three Rhododendron Species Growing Along an Elevational Gradient In The Southern Appalachians, Usa.***
- 3:40–3:55 pm Bahjat Fadi Marayati^o, Charles Apperson, Coby Schal, Loganathan Ponnusamy, Madhavi Kakumanu, Gideon Wasserberg, University of North Carolina at Greensboro, North Carolina State University. ***Identifying Oviposition Attractants from the Larval Rearing Medium of Phlebotomus papatasi, the Vector of Old-world Zoonotic Cutaneous Leishmaniasis.***

Oral Session J: Room 153A/B

Behavioral and Health Sciences

- 3:10–3:25 pm Sherette Godfrey^o, Checo Rorie, North Carolina A&T State University. ***MiRNAs in Triple-negative Breast Cancer: A Potential Biomarker.***
- 3:25–3:40 pm Marcelo Schwarz^o, Gideon Wasserberg, Brian Byrd, University of North Carolina at Greensboro, Western Carolina University. ***Ecology of La Crosse virus (LACv) vectors along a Forest-to-Field ecotone in western North Carolina.***
- 3:40–3:55 pm Anthony Daniel Greene^o, Coby Schal, Gissella Vasquez, Gideon Wasserberg. University of North Carolina at Greensboro, North Carolina State University, NAMRU-6, Peru. ***The Establishment of a Behavioral Bioassay to Study Lutzomyia Verrucarum Male Sex Pheromones Using Lutzomyia Longipalpis as a Model Species.***

*member of the CASCAS (collegiate) academy \ ^opresenter

Saturday Schedule

Oral Session K: Room 155A/B

Science Education

- 3:10–3:25 pm Karen Guzman^o, Campbell University. *Incorporation of Physical and Computer Modeling of Biological Macromolecules into Introductory and Upper Level Courses Engages Students and Provides a Way to Visualize Difficult to Understand Concepts.*
- 3:25–3:40 pm Iain Duffy^o and Darin Bell, Saint Leo University. *The Biology Capstone Project at a Small Liberal Arts College.*
- 3:40–3:55 pm Darin Bell^o, Saint Leo University. *A Comparison of Immigrant Minority and Native Minority Student Success Rates in General Chemistry.*

Oral Session L: Room 157 & 152

Science Methodology & Taxonomy

- 3:10–3:25 pm David A. Beamer^o, Nash Community College. *Taxonomic Status of the Black Shovel-nosed Salamander (*Desmognathus melianus*).*
- 3:25–3:40 pm Rongzhong Li^o, Wake Forest University. *A Real Random Number Generator Algorithm from Digital Camera Image Noise for Varying Lighting Conditions.*

Workshops

Saturday, Afternoon 4–5 pm

Big Chicken: Poultry, Mapping and Groundwater Impacts: Will Scott, Auditorium

Harnessing Research and Entrepreneurship for Health and Disabilities: Paúl Pauca, Room 153A/B

Turning Science Fiction into Science: Rob Hampson, Room 155A/B

Challenges and Opportunities in Commercializing Academic Medical Research: Daniel Yohannes and Luke Burnett, Room 157 & 152

Business Meetings

- 5:10–6 pm **NCAS Business Meeting**
Auditorium
- 5:10–6 pm **CANCAS Business Meeting**
155A/B

Social Gathering and Banquet

5:45–8:30 pm Saturday, Biotech Place Atrium

Musical Interlude by UNCSA String Quartet

Andrew Licht, violin; Mie Hirschfield, violin; Lanson Wells, viola; Malcolm Dyer, cello

Caterer: Pepper Moon

Board of Directors' Meeting

8:30–9 pm Room 155A/B

^omember of the CANCAS (collegiate) academy \ ^opresenter

Lecture Speakers

PLENARY LECTURE

Recent Advances in Drug Discovery: The Importance of Academic-Industrial Partnerships

G Protein Coupled Receptors (GPCRs) remain important drug targets as they are distributed throughout the body and regulate a broad range of physiological functions. Recent advances in the understanding of GPCR structure and function as well as the discovery of unique allosteric binding sites promise to allow the development of more selective and effective drugs.



Christian C Felder, PhD

Research Fellow, Neuroscience, Eli Lilly & Co.

Dr. Christian Felder is currently a Research Fellow in the Neuroscience Division at Eli Lilly & Co. in Indianapolis where he leads a drug development research group focused on neurological and neuropsychiatric diseases. During his tenure at Lilly he has held both Director and laboratory PI positions shepherding projects from inception into early clinical development. He collaborates extensively with academic and biotech partners.

Dr. Felder received a BS in Chemistry from the College of William and Mary, an MS in Biochemistry from the University of Maryland School of Medicine, and a PhD in Biochemistry from Georgetown University School of Medicine. He then joined the National Institute of Mental Health (NIMH) as a Staff Fellow in the laboratory of Nobel Laureate Julius Axelrod. He remained at the NIMH as Head of the Unit on Cell and Molecular Signaling where his lab focused on the molecular mechanisms of neurotransmitter action and their role in neuropsychiatric diseases. He has pursued his particular interests in cholinergic and cannabinoid biology through his transition from academic to industrial laboratory environments.

KEYNOTE LECTURE

Regenerative Biomaterials for Tissue Reconstruction



Jennifer Elisseeff, PhD

Tissue Engineering Center, Johns Hopkins University

Dr. Jennifer Elisseeff is a professor of ophthalmology and orthopaedic surgery at the Johns Hopkins School of Medicine. She also holds appointments in the Johns Hopkins Department of Chemical and Biological Engineering and Department of Materials Science and Engineering. Her research focuses on tissue regeneration. Dr. Elisseeff is the Jules Stein Professor of Ophthalmology and director of the Translational Tissue Engineering Center. Her team is engaged in engineering technologies to repair lost tissues. In 2004, Dr. Elisseeff cofounded Cartilix Inc., a startup that translated adhesive and biomaterial technologies for treating orthopedic disease, acquired by Biomet Inc. in 2009. In 2009, she also founded Aegeria Soft Tissue and Tissue Repair, startups focused on soft tissue regeneration and wound healing.

Special Session Speakers

The Center for Design Innovation

The Center for Design Innovation a multicampus research center within the statewide University of North Carolina system located in Wake Forest Innovation Quarter. The CDI is an innovation engine at the nexus of creativity, technology, and thought leadership. Our mission is to be a catalyst for economic development through research and lifelong learning opportunities in design thinking, product design, and creative production with advanced computing and imaging technologies. The CDI is a joint venture of the UNC School of the Arts, Winston-Salem State University, and Forsyth Technical Community College. We work broadly with members of academic, business, and community organizations across the region, nation, and world.



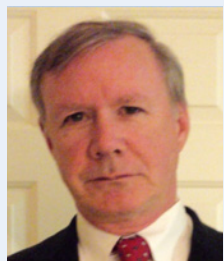
Pamela L. Jennings, PhD

Pamela L. Jennings, PhD is the director of the CDI. She received her PhD in Human Centered Systems Design and Digital Media at the School of Computer Science, University of Plymouth, UK; MBA at the Ross School of Business, University of Michigan; MFA in Computer Art at the School of Visual Arts in New York City; MA in Studio Art at the International Center of Photography/New York University Program; and BA in Psychology at Oberlin College. Dr. Jennings was an interaction design researcher at the IBM Almaden Research Center; and the SRI International Center for Technology in Learning. She served as a Program Officer at the National Science Foundation Computer & Information Science & Engineering directorate, Intelligent Information Systems Division, and led the NSF CreativeIT program. She was a Professor at Carnegie Mellon University with a joint appointment in the School of Art in the College of Fine Arts and the Human Computer Interaction Institute in the School of Computer Science. Dr. Jennings is a MacDowell Artist Colony Fellow. Her creative works are discussed in "Creating Their Own Image: the History of African-American Women Artists," Oxford University Press and "Struggles for Representation: African American Film/Video/New Media Makers," Indiana University Press.

Special Session Speakers

Biosciences Talent Required: National Center Biotechnology Workforce and BioNetwork

The National Center for the Biotechnology Workforce (NCBW) was created through a U.S. Department of Labor High Growth Grant Initiative in September 2004 and operated in this capacity until September 2008. On Oct. 1, 2008 the NCBW became a center of BioNetwork, a statewide biotechnology training and educational initiative through a cooperative agreement between the U.S. Department of Labor, Forsyth Technical Community College and the North Carolina Community College System's BioNetwork. In October 2012, the NCBW became the operational site for the Community College Consortium for the Biosciences Credentials initiative, funded by the U.S. Department of Labor under a round two TAACCCT grant.



Russ H. Read

Executive Director

*National Center Biotechnology Workforce of BioNetwork & Forsyth Tech
Winston-Salem, N.C.*

Russ H. Read, BSc. Dip. Ed, Grad. Dip. Inst. Administration, MA, has worked in the bioscience industry for over thirty five years. Formerly he was an executive with the Burroughs Wellcome and Glaxo Wellcome companies. He was heavily involved with the commercial development of antivirals like AZT and 3TC, which are mainstay treatments for HIV illness. He was CEO of the Kucera Pharmaceutical Company, a start-up biopharmaceutical company based in Winston-Salem. Russ has a special interest in the bioscience workforce. He has recently led a national biotechnology workforce effort for 10 years called the National Center for the Biotechnology Workforce (NCBW). The NCBW is based in Winston-Salem and was originally a large U.S. Department of Labor grant but is now a part of North Carolina's BioNetwork and Forsyth Technical Community College. The NCBW focuses on achieving best practices for bioscience workforce training with its national partners, such as the U.S. Department of Labor and the NSF. A recent partner is The Manufacturing Institute based in Washington, D.C. In October 2012, a 12-member national consortium of community colleges, led by Forsyth Tech, won a \$15 million U.S. Department of Labor Trade Adjustment Assistance grant looking at building biosciences workforce skill standards and credentials. Russ is the consortium's Project Director. Russ is also the Principal Investigator for the NSF ATE Project grant named the Biosciences Industrial Fellowship Program. He currently serves as Past Chair of the Advisory Committee for the NC Biotech Center's Piedmont Triad regional office and is a Director of NC BIO. He also serves on the National Visitor's Committee of the NSF ATE national program called Bio-Link and is an advisor to the NSF ATE NBC2 program.

Special Session Speakers

The Center for Nanotechnology and Molecular Materials at Wake Forest University

The Center for Nanotechnology and Molecular Materials is a multidisciplinary research and development facility focused on innovation at the intersection of new device technologies and advanced novel material systems. The research teams that make up NanoTech focus on research and innovation in three primary areas: green/alternative power technologies and biomedical technologies as well as advanced materials physics. The Center exists to support these teams in the creation of world-class, high-impact research efforts in these areas. The critical support role offered by the Center lies in Advanced Materials processing and characterization. In this way, NanoTech is a gateway for its members to access capabilities.



Dr. David Carroll

Director

Department of Physics

Wake Forest University

Outstanding in the Field: Syngenta's Innovations in Biology and Chemistry Help to Feed a Growing World

With a world population expected to reach 9 billion by 2050, the need to address food security has never been greater. Syngenta is focused on providing innovative solutions to increase crop productivity in a sustainable way by using less water, land and energy. Using biology and chemistry, Syngenta R&D scientists have made breakthrough discoveries. Examples of these include developing a novel fungicide discovered from mushrooms, producing a drought-tolerant corn hybrid and pioneering the sequencing of the rice genome. Syngenta R&D operates on 180 locations around the world with the North American Crop Protection Headquarters located here in the North Carolina Piedmont (Greensboro).



A. Kent Kabler

A. Kent Kabler is an environmental scientist at Syngenta Crop Protection, LLC in the R&D Product Safety group. Kent conducts laboratory and field studies that are used to characterize the fate and effects of agrichemicals in the environment. Data from these studies are used in computer models that estimate chemical exposure concentrations for non-target plants and animals as well as identify any areas of potential ecological risk from such uses. Kent is a biochemist who has worked in the agrichemical industry for over 20 years in a variety of R&D areas, including analytical methods development,

trace residue analysis, environmental fate, ecotoxicology and risk assessment. He is a member of the American Chemical Society and the Society of Environmental Toxicology and Chemistry.

Workshop Speakers

Turning Science Fiction into Science

Science Fiction is about the possible, but yesterday's fiction may already be old news. What is exciting and new in science, and how do we as scientists help authors 'get it right' in their stories? Explore some practical ways to interact with authors, and even influence the profile of science in the public eye.



Robert E. Hampson, PhD

Dr. Robert Hampson is a neurophysiologist in the Department of Physiology & Pharmacology at Wake Forest School of Medicine. Dr. Hampson's research on the neural encoding of memory in rats, monkeys and humans has contributed to development of a hippocampal prosthesis for restoration of memory, euphemistically referred to as "Replacement Parts for the Brain." His expertise in physiology, pharmacology and biomedical engineering is in demand by the science fiction, game development and entertainment field. In addition to consulting for authors and producers, Dr. Hampson is engaged in public education through conventions, blogging and articles for various science fiction outlets.

Big Chicken: Poultry, Mapping and Groundwater Impacts

North Carolina faces both agricultural and industrial challenges to maintaining our pristine waterways, air and soil. Will Scott will discuss poultry, soil and water sampling and the problems in showing a connection between current poultry waste application and downstream pollution. Innovative solutions to our current issues are key to N.C.'s environmental future, and this workshop will promote synergistic interactions between non-profits and the academic scientific community to solidify leadership in this arena.



Attorney Will Scott

Will Scott is the Yadkin Riverkeeper. Yadkin Riverkeeper's mission is to respect, protect and improve the Yadkin Pee Dee River Basin through education, advocacy, and action. Scott is a North Carolina native, having been raised in Chatham County, where he did Streamwatch, measuring stream health by tallying flora and fauna. He grew up by the Haw River, and explored N.C.'s major riverbeds via canoe. He holds a BA in Political Science from the University of North Carolina, and a Juris Doctor from the University of North Carolina School of Law. He addressed issues of state groundwater and air pollution while working at the Southern Environmental Law Center in Asheville. After managing a winning state house campaign in Buncombe County, he joined the Riverkeepers in November 2014 to combine environmental law with grassroots organizing.

Workshop Speakers

Harnessing Research and Entrepreneurship for Health and Disabilities

The rapid advancements in many areas of computer science, the proliferation of mobile sensors and computing hardware, and e-marketing are helping redefine the user application landscape. In this workshop, we will explore current and future technologies and processes in the interface between these fields that are paving the way for innovation in health and disability applications.



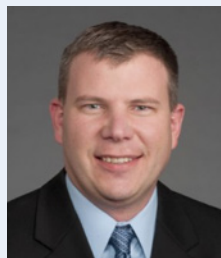
Victor Paúl Pauca, PhD

Paúl Pauca earned his BS and MS at Wake Forest University, and PhD at Duke University. He is now an associate professor of computer science at Wake Forest University, co-founded Apps for the Greater Good to commercialize the Verbal Victor app and develop new products. Apps for the Greater Good was registered as an LLC in May. Dr. Pauca came up with the idea for Verbal Victor through frustration at the cost and complexity of other tools available to help children like his own son, Victor, who suffers from the genetic disease Pitt Hopkins Syndrome, which delayed his ability to communicate through speech. Dr. Pauca is working with undergraduate and graduate students to develop novel projects.

Workshop Speakers

Challenges and Opportunities in Commercializing Academic Medical Research

The old models of commercializing non-drug biomedical research often succeeded with short-term business plans and investment models. Today, technologies take far longer and require more money to develop to exit or market. For those interested in commercializing academic research efforts, new strategies are required that address present market challenges.



Luke Burnett, PhD

Dr. Burnett is the Chief Science Officer at KeraNetics, having extensive experience with large and small animal surgical models and biomaterials. He supervises 12 active government-funded projects in the areas of wound and burn healing, 3D printing, drug delivery, resuscitation fluid, bone, muscle and nerve regeneration. In the last three years, Dr. Burnett and his team at KeraNetics have received six Phase I SBIRs (5 DoD, 1 NIH), five of which have been turned into awarded Phase II projects (4 DoD, 1 NIH).

Dr. Burnett is also the PI or Co-I on four current CDMRP project awards in the areas of antibiotic drug delivery, nerve regeneration, joint contracture and bone regeneration, as well as a BARDA radiation injury study. Dr. Burnett has a team of 13 PhD-level scientists and MS/BS level technicians who conduct the research and manufacture keratin biomaterials for the various projects he supervises. Dr. Burnett has extensive leadership experience both in science, leading teams of industry and academic scientists, as well as over 25 years in the U.S. Army where he holds the rank of Colonel and is currently a Brigade Commander in the North Carolina Army National Guard.



Daniel Yohannes, PhD/MBA

Dr. Yohannes, Associate Director, Product Innovations at Wake Forest Innovations, has deep expertise in drug discovery and development, and is responsible for the development of the therapeutics portfolio of Wake Forest Innovations, the commercialization arm of Wake Forest School of Medicine, Wake Forest University and Wake Forest Baptist Medical Center. Dr. Yohannes has spent over 20 years in the pharmaceutical industry, where he has held progressively senior leadership positions at Infinity Pharmaceuticals, ArQule, Inc. and Targacept, where he was Senior Director and head of Drug Discovery and Development in addition to being the Therapeutic Area Leader for Addictions.

He started his career at Pfizer, where he spent eight years in the Neuroscience drug discovery group working on multiple programs, including the smoking-cessation program that gave birth to Chantix®. Dr. Yohannes has shepherded multiple drug candidates into the clinic, and is the author of over 75 publications, patents and invited presentations. He also holds an MBA degree from the University of Rhode Island.

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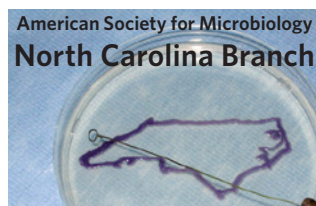


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