

117th Annual Meeting *of the* North Carolina Academy of Science

March 12-13, 2021

Vision 2021:
Seeing Connections – Solving Problems



LENOIR-RHYNE
UNIVERSITY

North Carolina
Academy of Science
Since 1902



WELCOME TO LENOIR-RHYNE UNIVERSITY

On behalf of the College of Natural Sciences and Mathematics and Lenoir-Rhyne University, welcome to the virtual 117th Annual Meeting of the North Carolina Academy of Science. Our faculty and students have been a part of the academy for many decades and have always found that the annual meeting is one of the highlights of the academic year. While ideally we would be holding the event on our inviting campus, in this unusual year we are truly excited to be hosting a virtual version. We have been busily preparing for your arrival on our Zoom screens for some time now. We are eager for you to immerse yourself in the programming and experiences that have been carefully planned for your weekend.

Please take time to learn about the wonderful research our CASCAS and other NCAS members have been conducting, be amazed by our engaging keynote speaker's descriptions of biophysical interactions of animals with their environment, and broaden your understanding at our workshops. Prepare to be inspired by the variety of ways the scientists you'll "meet" are making novel connections, providing interesting and useful solutions to real problems. Give a special shout out to those 2020 CASCAS graduates who have come back to share their postponed presentations with us!

Our students, faculty and staff are honored to assist you in ensuring that the 2021 Annual Meeting experience is smooth, rewarding and memorable.



Judy Moore, Michael Stiff and Marsha Fanning, local events coordinators, and LR's Natural Sciences faculty and staff



Alex and Lee George Hall, School of Natural Sciences building

ABOUT LENOIR-RHYNE UNIVERSITY

Lenoir-Rhyne University is a private, coeducational, comprehensive institution enrolling more than 2,700 students at its Hickory, North Carolina campus, and its graduate centers in Asheville, North Carolina, and Columbia, South Carolina. The university supports more than 50 undergraduate majors, nearly 30 masters' degree programs and one doctoral program with a robust liberal arts foundation. Lenoir-Rhyne strives to foster an environment that promotes vocational discernment and the growth of the whole person through close relationships with faculty and staff and a rich sense of connectedness between a student's living and learning communities. Affiliated with the Evangelical Lutheran in America, Lenoir-Rhyne University promotes a diverse campus open to people from all religious backgrounds.

Lenoir-Rhyne's College of Natural Sciences and Mathematics is housed in the George Hall/Minges Science Building and Mauney-Schaeffer Hall. It includes undergraduate programs in biology, chemistry, engineering physics, mathematics and computer science, and a graduate program in sustainability. Regardless of their career goals, all of our students conduct independent research projects which culminate in the presentation of their work, often at the annual NCAS conference. Whether pursuing a graduate program in medicine or the basic sciences, the NC Academy of Science has helped our students on their path to becoming successful scientists. The academy has been a wonderful asset to our students for many years, and we are thrilled to host this year's online event.



WELCOME FROM THE PRESIDENT OF LENOIR-RHYNE UNIVERSITY

On behalf of Lenoir-Rhyne University, I welcome you to this virtual annual meeting of the North Carolina Academy of Science, one of North Carolina's premier events dedicated to the promotion of scientific research and education in the sciences. While we had hoped to see you in person on our beautiful campus, we are delighted to host you virtually for this important event.

Every year, this meeting brings together scientists, science faculty members and students from institutions across the state. It is an opportunity to share your passion and excitement about science with a network of like-minded researchers, academics and students.

This year's theme, "Vision 2021: Seeing Connections – Solving Problems," highlights the importance of basic science in helping identify solutions to world's seemingly intractable problems. I cannot imagine a timelier topic than this, and I trust that there will be lively discussions and debates.

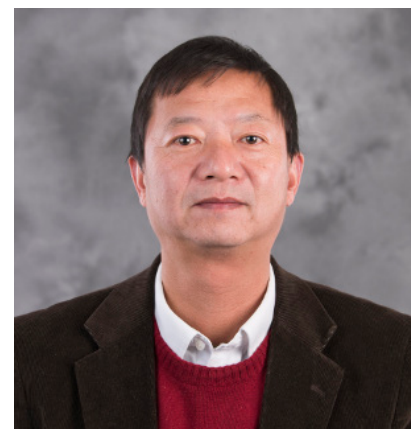
Over these two days, you will share your research, discover new possibilities and make new connections that will help further your study. The presenters, workshops and exhibitors offer additional opportunities, and I hope you take advantage of them.

I would like to thank Dr. Judy Moore, associate professor of biology at Lenoir-Rhyne, Dr. Marsha Fanning, professor of biology and chair of the School of Natural Sciences, and Michael Stiff, assistant professor of biology, who served as our event coordinators. Their hard work in bringing this event to fruition with the added complexities of the virtual format is greatly appreciated. I would also like to thank you for your work and leadership in the sciences.

Enjoy the annual meeting and your time together.

Sincerely,

Dr. Fred Whitt
President



WELCOME FROM THE NCAS PRESIDENT

It is my privilege and great pleasure to welcome you all to the 117th Annual Meeting of the North Carolina Academy of Science (NCAS). Our annual meeting is one of the major scientific events in the state of North Carolina and has been strategically held in different locations around the state since 1902. This year's conference is virtually coordinated from the beautiful campus of Lenoir-Rhyne University and the conference's theme is Vision 2021: Seeing Connections – Solving Problems.

This is an extremely difficult time for everyone on the Earth to fight coronavirus COVID-19; science and the role for science in public policy have never been more important today in everyone's daily life. In this year's annual meeting, our researchers will present and exchange their new discoveries through both poster and oral sessions, our outstanding keynote speaker will share the excitement and importance of conducting basic scientific research, exploring the research frontiers in animal movement and robotics. Our outstanding workshop panelists will share their research experiences in the time of COVID-19 and their insights on engaging communication of science from their experiences in public media outlets.

We hope that the 2021 NCAS Annual Meeting stimulates you to expand your scientific curiosity, broaden your scientific horizons and to build novel connections that may provide solutions for this world's difficult problems. I would like to thank Dr. Fred Whitt, President of Lenoir-Rhyne University, for allowing us the opportunity to share your wonderful digital facilities, and for all supporters who are making the 117th Annual NCAS meeting a success.

Thank you!

Lei Zhang
NCAS President, 2020-2021

Friday, March 12, 2021

1-2PM	Finance & Strategic Planning Committee Meeting	
2-5PM	Board of Directors Meeting	
5:30-6PM	Lightning Talk Judges' Meeting	
6-7:30PM	Lightning Talk Q & A	
Immediately following Q & A	Lightning Talk Judges' Meeting	
7:30-8:15PM	Welcome Remarks	

Saturday, March 13, 2021

7:30-8:15AM	Judges and Moderators Meeting	
8AM-4AM	Welcome and Overview of Schedule	Slides
8:15-9:30AM	ORAL SESSION 1: CASCAS AND NCAS Presentations (*judged in CASCAS Derieux competition)	

ECOLOGY, BOTANY AND ZOOLOGY

8:15AM	Gracie Perry-Garnette*, Guilford College	Stony Coral Tissue Loss Disease in the Turks and Caicos Islands
8:30AM	Jean Ross*, Elon University	Multiple functions for multiple signals: the role of sound and vibration in mediating courtship and competition in a neotropical katydid
8:45AM	Kylie Dahlberg*, Lenoir-Rhyne University	The effects of simulated herbivory on vine growth of native honeysuckle (<i>Lonicera sempervirens</i>) and non-native honeysuckle (<i>Lonicera japonica</i>)
9AM	Samantha Jarrett*, Lenoir-Rhyne University	Foraging behaviors of ruby-throated hummingbirds (<i>Archilochus colubris</i>) at sites of varying food consistency
9:15AM	Charles Fox, Lenoir-Rhyne University	Comparison of abnormal behaviors between captive chimpanzee groups (<i>Pan troglodytes</i>) at the North Carolina zoo

CELL BIOLOGY, MOLECULAR BIOLOGY AND PHYSIOLOGY

8:15AM	Kelsey Krumanocker*, Lenoir-Rhyne University	Using RT-PCR to determine the role of programmed cell death in <i>Gossypium hirsutum</i> fiber maturation
8:30AM	Ryan Peterson*, Campbell University	Expression and purification of the E1 subunit of the 2-oxoglutarate dehydrogenase complex for abiological catalysis
8:45AM	Katherine Darrigrand*, Campbell University	Enzymatic dynamic kinetic resolution for the stereoselective synthesis of alpha-hydroxy ketones
9AM	John Gonzalez*, Lenoir-Rhyne University	<i>Lumbriculus variegatus</i> as a model for demonstrating vascular calcification and regeneration following exposure to warfarin
9:15AM	Spencer Welland*, Lenoir-Rhyne University	CBCT image enhancement through machine learning: the impact of loss functions

CHEMISTRY, BIOCHEMISTRY, PHYSICS AND SCIENCE EDUCATION

8:15AM	Katherine Darrigrand, Campbell University	Enzymatic dynamic kinetic resolution for the stereoselective synthesis of alpha hydroxyl ketones
8:30AM	Yuan Li, Winston-Salem State University	Combinatorial measures of Boolean nested canalizing functions
8:45AM	Dennis Edgel, UNC Pembroke	Meteorology and Myth II: A Fair Candlemas
9AM	Selina Cortez Diaz, Lenoir-Rhyne University	Ungulate herbivore effects on insect community diversity in the Texas Hill Country
9:30-9:45AM	Break – Informal Conversation Time via Zoom	
9:45-11AM	ORAL SESSION 2: CASCAS and NCAS Presentations	

Saturday, March 13, 2021, continued

ECOLOGY, BOTANY AND ZOOLOGY

9:45AM **Jessica Wakeman*, Campbell University**
Optimization of *Dunaliella salina* growth using commercial fertilizers and salts

10AM **Olivia Nunn*, Lenoir-Rhyne University**
Ant species distribution and density varies based on tree species

10:15AM **Jefferson Norwood*, Lenoir-Rhyne University**
The effect of ocean acidification on phototaxis within the green sea urchin (*Strongylocentrotus droebachiensis*)

10:30AM **Caitlyn Vester*, Campbell University**
Microbial diversity of Campbell University ants

10:45AM **Seana Finn, Shaw University**
Investigating evolutionary transition in hunting tactics in raptors

CELL BIOLOGY, MOLECULAR BIOLOGY AND PHYSIOLOGY

9:45AM **Jillian Petersen*, Lenoir-Rhyne University**
Kinematic responses of zebrafish (*Danio rerio*) to predation in an acidified environment

10AM **Anslei Foster, UNC Greensboro**
Characterization of genetic mechanisms influencing perenniality variation in *Arabidopsis lyrata*

10:15AM **Minh Huy Giang, UNC Pembroke**
Exercise mimetic augments autophagy-lysosomal protein clearance and provides protection against protein accumulation-induced synaptopathology

10:30AM **Robert Brown, Campbell University**
Cloning, expression and purification of human carbonic anhydrase 2 in *E. coli*

10:45AM **Eid Haddad, Fayetteville State University**
Attempt into recording chick embryo electrocardiogram using IX-TA 220 system

10:45-11:15AM **Break – Informal Conversation Time via Zoom**

11:15AM-12:15PM **KEYNOTE ADDRESS** – How to Walk on Water and Climb up Walls, Dr. David Hu

12:15-12:45PM **CANCAS Judges' Meeting**

12:15-1:30PM **Lunch Break and Informal Conversation**

1:30-3:45PM **GEP Workshop** (prior registration required), Dr. Marisol Santisteban, UNC Pembroke

2:45-3:45PM **WORKSHOPS and PANEL DISCUSSIONS**
How to Teach Difficult Molecular Genetics Concepts Using a Genome Browser and How to Engage Your Students in Genomics Research

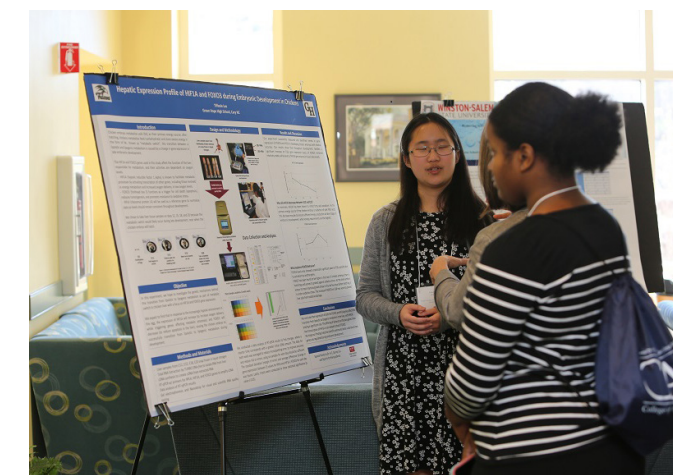
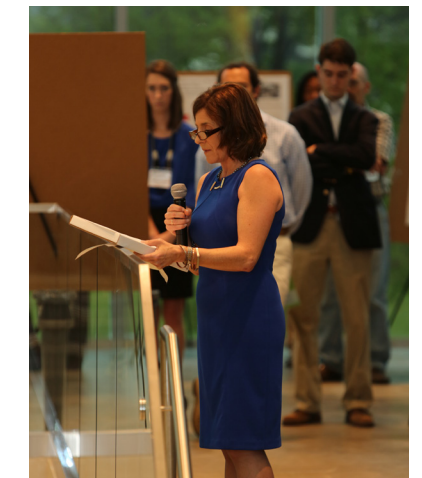
Research in the Time of Covid

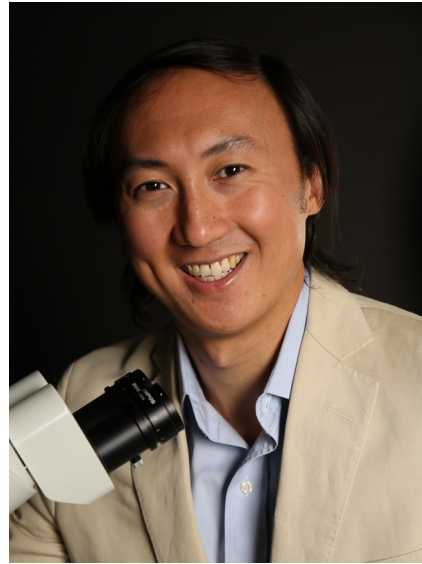
Communicating Science in the Public Square

4-5PM **NCAS Senior Academy Business Meeting**
CANCAS Business Meeting

5:15-6:45PM **AWARDS CEREMONY**

6:45-7:15PM **Board of Directors Meeting**





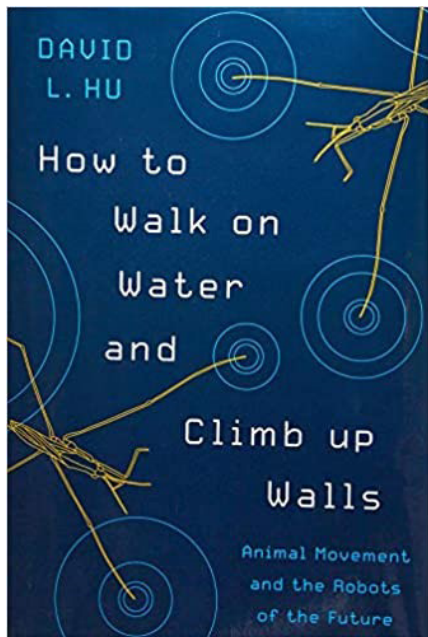
HOW TO WALK ON WATER AND CLIMB UP WALLS

Dr. David Hu, Georgia Institute of Technology

11:15 AM on Saturday

Insects walk on water, snakes slither and fish swim. Animals move with astounding grace, speed and versatility, but how do they do it and what can we learn from them? From the incredible efficiency of the wet dog shake to colonies of ants building rafts out of their own bodies, David Hu shows how animals have adapted and evolved to traverse their environments, taking advantage of physical laws with results that are startling and ingenious. Dr. Hu has graciously provided NCAS with a promo code for a 30 percent discount for his book through Princeton Press. Further, in lieu of a book signing, conference attendees may request one of his signed bookplates to affix to their copy of *How to Walk on Water and Climb Up Walls*. Contact Judy Moore at judy.moore@lr.edu with your mailing address by April 15.

Dr. David Hu is a mechanical engineer who studies the interactions of animals with water. Originally from Rockville, Maryland, he earned degrees in mathematics and mechanical engineering from M.I.T., and is now professor of mechanical engineering and biology and adjunct professor of physics at Georgia Tech. He is a recipient of the National Science Foundation CAREER Award for Young Scientists among numerous other scholarly recognitions, and has also been recognized by the tongue-in-cheek Ig Nobel Prize in Physics and the Pineapple Science Prize. His work has been featured in *The Economist*, *The New York Times*, *Saturday Night Live*, and *Highlights for Children*. He is the author of the book *How to Walk on Water and Climb up Walls*, published by Princeton University Press. He lives with his wife and two children in Atlanta, Georgia.



HOW TO TEACH DIFFICULT MOLECULAR GENETICS CONCEPTS USING A GENOME BROWSER AND HOW TO ENGAGE YOUR STUDENTS IN GENOMICS RESEARCH

1:30-3:45PM Saturday

Led by Marisol Santisteban (UNC Pembroke), this workshop is an initiative of the Genomics Education Partnership (GEP) and will introduce participants to the GEP community and allow you to explore their excellent curricular resources.



APPLYING TO GRADUATE AND PROFESSIONAL SCHOOLS

1:30-2:30PM Saturday

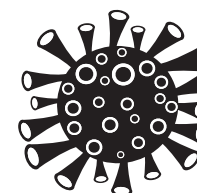
Panelists will include representatives from several graduate and professional schools in North Carolina who will provide expert insight and advice for undergraduate students considering applying to graduate and/or professional school as the next step in their career preparation.



COMMUNICATING SCIENCE IN THE PUBLIC SQUARE

2:45-3:45PM Saturday

Panelists are Rob and Haley Nelson, an Emmy award-winning science communication team who have created the nonprofit Untamed Science. Both Rob and Haley have been featured on Animal Planet and the Science Channel, and have recently published the book *Mother Nature is Not Trying to Kill You*. The third panelist is Carly Anne York, a Lenoir-Rhyne biology professor, contributor for the Science Channel and regular guest on podcasts and YouTube channels. The three individuals will discuss science communication.



RESEARCH IN THE TIME OF COVID

[insert time]PM, Saturday

NCAS Senior Academy Faculty members will lead a discussion on the opportunities and challenges of continuing research during pandemic restrictions. The aim is for this discussion to inspire creative ideas for meeting the challenge of supporting student research during this time.



FRANK JOSEPH SCHWARTZ, 1929-2019

The North Carolina Academy of Science reflects on the incredible life and memorable contributions of its distinguished colleague and friend with the passing of Dr. Frank J. Schwartz on November 26, 2018. Frank served as journal editor for more than 19 years (1995-2014) while Professor and Curator of Fishes at UNC’s Institute of Marine Sciences (IMS) in Morehead City. He is our longest serving editor, the only person to have edited the journal under both its original (Journal of the Elisha Mitchell Scientific Society) and current title (Journal of the North Carolina Academy of Science). In 2014, the Academy bestowed the honorary title of Editor Emeritus on Dr. Frank J. Schwartz in recognition of his long and distinguished service.

Born in Pennsylvania, Frank earned a master’s degree in Fisheries Biology and a doctoral degree in Ichthyology from the University of Pittsburgh. He held several faculty positions before joining the IMS faculty and mentored many graduate students, but clearly, it was a passion for aquatic research that filled his days. He traveled extensively in connection with collection and survey expeditions around the world and deep under the sea, sampling both freshwater and marine systems, with funding from the Smithsonian among other highly prestigious institutions. He received numerous honors and distinctions, and will be long remembered as one of the world’s foremost experts on sharks. He clocked a thousand research expeditions (1967-2011) and published extensively in scientific journals and in popular media publications such as Our State and Wildlife in North Carolina. Late in life when his body could no longer make the journey aboard his ship, the Capricorn, he retired to his IMS office and later worked from a wheelchair at his kitchen table, penning papers by hand and compiling a bibliography of the literature on hybrid fishes. He passed away at his home at the age of 89 and is remembered with fond gratitude.

BARBARA HIBBS BLAKE, 1937-2019

On August 18, 2019 our long time NCAS colleague and former member of our Board of Directors, Barbara Blake (82) of UNC-Greensboro and Bennett College, died of stroke complications. Barbara was a noted mammologist who studied the physiology of chipmunks, voles and bats. She was active in Sigma XI, a research honor society for scientists and engineers, and in the American Society of Mammalogists (ASM), serving as editor-in-chief and in other leadership capacities. ASM recognized Barbara with the Hartley H.T. Jackson Award in 2007 for her long and outstanding service to the organization.

Barbara was born in Roseburg, Oregon and graduated from Portland State University before completing her doctoral studies at Yale University. Her professional career included appointments at Drew University (NJ), the University of London (England), Bennett College (Greensboro, NC), and University of North Carolina at Greensboro. Barbara loved observing nature and delighted in the opera and theatre. Barbara and her husband established the Anthony and Barbara Blake Scholarship Fund at Guilford College in Greensboro to support students in their quest for an outstanding education. She is survived by her husband of 56 years, her two daughters, siblings, granddaughters and her cherished dog Buddy. Thank you, Barbara, for your substantial impact on our NCAS community.



ERIN STEWART LINDQUIST, 1975-2019

Dr. Erin Stewart Lindquist was an active member of NCAS and passionate about celebrating undergraduate research. She mentored countless student projects and served on our Board of Directors in a number of capacities, including as a past CASCAS director, helping organize undergraduate student workshops and awards. Erin passed away peacefully in her home in Raleigh, NC on August 2, 2019 surrounded by her loving family. She was born in Saratoga Springs, NY in 1975.

Erin graduated Summa Cum Laude from Cornell and received her doctorate in ecology from the University of Georgia. Since 2006, Erin distinguished herself as professor of Biology and Environmental Sustainability at Meredith College in Raleigh. She was one of the original founders of the Ecological Research as Education Network (EREN) project, an initiative to establish a research and education network across primarily undergraduate institutions worldwide. Before Meredith College, Erin served as a faculty for the Organization for Tropical Studies, sharing her love of plants, the tropics, and research with undergraduate and graduate students through courses in Costa Rica while authoring the definitive scientific book on the trees of Cabo Blanco. These passions were also instilled in her students at Meredith as she inspired everybody around her to improve themselves and make the world a kinder place. She gracefully dealt with cancer for seven years, continuing to enjoy every minute with her kids and inspire all who knew her. We are thankful for Erin’s betterment of our Academy and our world.





LENOIR~RHYNE UNIVERSITY

We of the School of Natural Sciences at Lenoir-Rhyne University hope you have been refreshed and reinvigorated by your time with us at the 2021 NCAS Annual Meeting.

See you next year!



Annual Meeting 2022

Campbell University

Buies Creek, NC



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