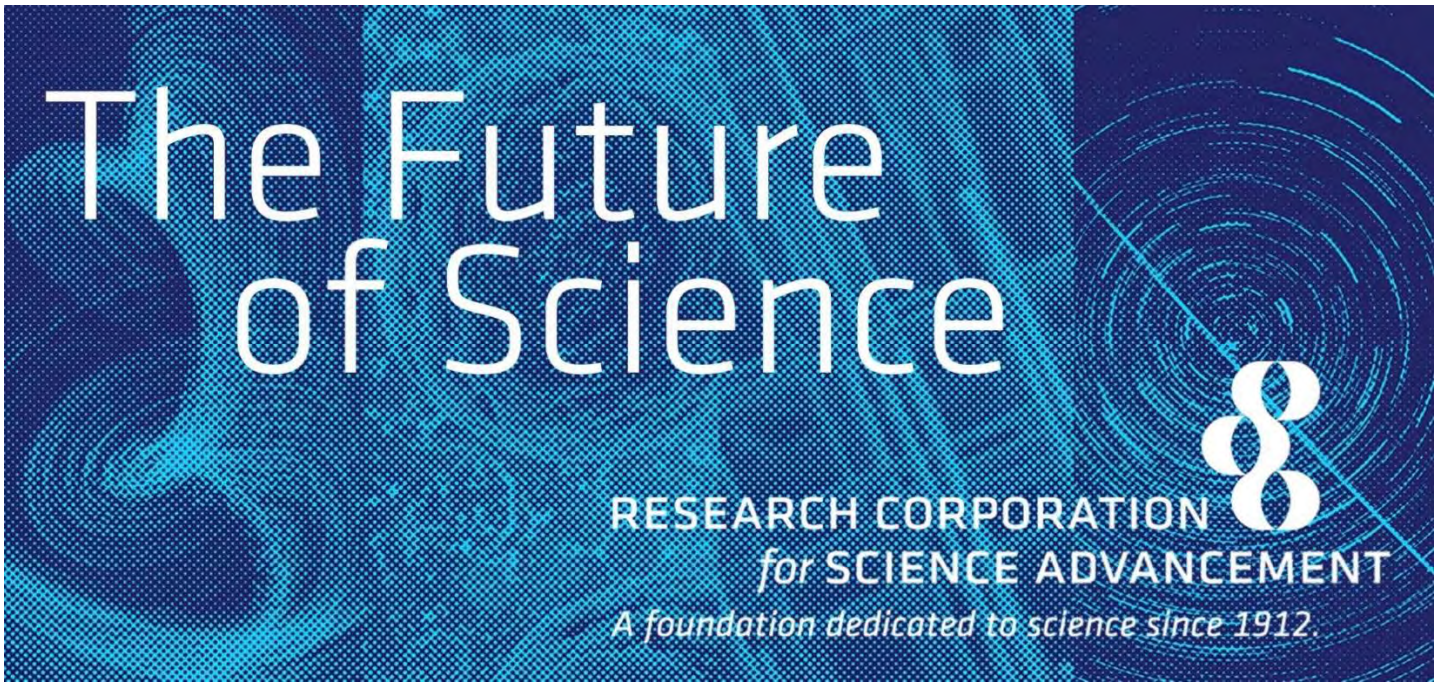


# Summary of 2023 Awards

Research Corporation for Science Advancement supports early career scientists at colleges and universities in the United States and Canada through two core programs: the Cottrell Scholar Program and Scialog.

**Cottrell Scholar Program** develops outstanding teacher-scholars recognized by their scientific communities for the quality of their research programs, innovation in education, and potential for academic leadership. In 2023, Cottrell Scholar Program funding included $2,600,000 for 26 initial Cottrell Scholar Awards, $100,000 for Cottrell Scholars Collaborative Awards, and $215,000 for Cottrell Plus Awards, which include the competitive SEED, STAR and IMPACT awards. The inaugural year of our new Holland Awards welcomed six senior scholars to the Cottrell Scholar Community with awards totaling $30,000, while the second year of our Cottrell Postbac Awards supported seven Cottrell Scholars with awards totaling $350,000. One Cottrell Scholar received $5,000 to fund a regional meeting. **2023 total: $3,300,000**

**Scialog** promotes dialogue and community-building to catalyze transformational science through collaborative, interdisciplinary research. In 2023, RCSA awarded $1,049,000 to early career scientists for research through Scialog Collaborative Innovation Awards. Partner philanthropies — which in 2023 included the Azrieli Foundation, the Paul G. Allen Frontiers Group, the Canadian Institute for Advanced Research (CIFAR), the Chan Zuckerberg Initiative, ClimateWorks Foundation, the Frederick Gardner Cottrell Foundation, the Heising-Simons Foundation, The Kavli Foundation, NASA, the Alfred P. Sloan Foundation, the U.S. Department of Agriculture, and Walder Foundation — contributed a further $5,244,500 toward Scialog awards. **2023 total: $6,293,500**

RCSA strives to be broadly inclusive in support of early career scientists. To learn more about our programs, visit our website at **rescorp.org**.

# Cottrell Scholar Program

Nurturing an interdisciplinary community of outstanding teacher-scholars, the CS program fosters synergy among faculty at major research universities and primarily undergraduate institutions in the United States and Canada. Cottrell Scholars receive an initial award of $100,000, engage in an annual networking event to share insights and expertise, and have the opportunity to develop initiatives to enhance science education and scientist career development through the Cottrell Scholar Collaborative. Outstanding candidates in chemistry, physics, and astronomy are admitted to the ranks of Cottrell Scholars through a stringent peer-review process based on their innovative research and education proposals. Once designated a Cottrell Scholar, several levels of competitive funding to promote career growth become available through Cottrell Plus Awards.

# 2023 Cottrell Scholar Awards

**Daniel Anglés-Alcázar**, Astronomy, University of Connecticut — *Multi-Scale Physics of Supermassive Black Hole Growth and Feedback in Galaxies and Fundamental Implications in Cosmology*

**Sarah Ballard**, Astronomy, University of Florida — *A Window into Day and Night: Constraining Nodal Precession of Temperate Planets Around Small Stars*

**Cacey Bester**, Physics, Swarthmore College — *Creep Across Scales: The Role of Disturbances on Creep in Disordered Media*

**Ambika Bhagi-Damodaran**, Chemistry, University of Minnesota Twin Cities — *Reprogramming Hypoxia Signaling in Laboratory and Inorganic Chemistry Education in Classroom*

Matthew Caplan, Physics, Illinois State University — *Impacts of Central Primordial Black Holes on Stellar Evolution*

Javier Duarte, Physics, University of California, San Diego — *Building a Better Foundation: Teaching Physicists and Machines How to Learn from Data*

Christopher Durr, Chemistry, Amherst College — *Exploring the Synthesis and Mechanism of Single-Site and Cationic Group V Catalysts for the Production of Biodegradable Polymers*

Megan Fieser, Chemistry, University of Southern California — *Controlling the Product Selectivity for the Catalytic Dechlorination of Poly (Vinyl Chloride)*

Ronit Freeman, Chemistry, University of North Carolina at Chapel Hill — *Forming Connections: From Interacting Self-Assembled Hubs to TACtICS (Teaching Convergence to Increase Innovation in Science) for Undergraduates*

Graham Giovanetti, Physics, Williams College — *A Study of Single Electron Backgrounds in a Low-Threshold Argon Detector*

Vera Gluscevic, Astronomy, University of Southern California — *Discovering Dark Matter with Cosmology*

Ling Hao, Chemistry, George Washington University — *Capturing Molecular Communications Using Mass Spectrometry and Enhancing Science Communication in Chemistry Education*

Mark Herzik, Chemistry, University of California, San Diego — *Next-Generation Electron Microscopy — Visualizing Enzymes in Action and Development of Hands-on Curriculum*

Mark Ilton, Physics, Harvey Mudd College — *The Physical Principles Governing High-Rate and Large Deformation Elastic Recoil*

Sarah King, Chemistry, University of Chicago — *Directing Energy and Charge Transfer in Molecular Moiré Materials*

Lydia Kisley, Physics, Case Western Reserve University — *Imaging the Physical Dynamics of Analytes in Commercial Separation Materials and Using Core Facilities in the Classroom*

David Leitch, Chemistry, University of Victoria — *Building Universal Quantitative Models for Catalysis from the Bottom Up, and Building Connections in Undergraduate Organic Chemistry Education*

Allegra Liberman-Martin, Chemistry, Chapman University — *Broadening Applications of the Weakly Coordinating Triflimidate Anion in Main Group Catalysis*

Kristen McQuinn, Astronomy, Rutgers University — *The Smallest Galaxies Hold the Biggest Clues for Understanding Galaxy Formation and Cosmology*

**Alison Patteson**, Physics, Syracuse University — *Soft Matter Physics of Biofilm Growth: A New Role of Substrate Viscoelasticity in Biofilm Growth*

**William Pfalzgraff**, Chemistry, Chatham University — *Enhancing Reactivity and Selectivity at Polarized Interfaces*

**Chanda Prescod-Weinstein**, Physics, University of New Hampshire — *Searching for a Vibrant Dark Sector*

**Noel Richardson**, Astronomy, Embry-Riddle Aeronautical University — *Massive Binaries Have an Important Impact on Both Their Environments and on Undergraduate Education*

**Daniel Tabor**, Chemistry, Texas A&M University — *Intelligent Optimization of Organic Photophysical Chemical Spaces*

**Julian West**, Chemistry, Rice University — *Sustainable Difunctionalization of Alkenes Via Bio-Inspired Radical Ligand Transfer and Training Scientists to Engage with the Greater Public*

**Christopher Whidbey**, Chemistry, Seattle University — *Illuminating the Dark Proteome: ABPP for High-Throughput Experimental Characterization of Proteins*

# Cottrell Scholars Collaborative

At the annual Cottrell Scholar Conference, participants are encouraged to form teams and develop collaborative projects with potential national impact in science education. Through the Cottrell Scholars Collaborative program, RCSA gave awards of $25,000 each to four projects in 2023 focused on the conference theme of incentivizing cultural change in academia:


***Academic Leadership Training (ALT) 2.0***

A 2014 Cottrell Scholar Collaborative grant helped launch a unique and well-regarded series of leadership workshops to help participants advance through their paths in the physical sciences as department chairs, deans, provosts, or center directors. Academic Leadership Training (ALT) workshops were held in person annually at the American Chemical Society headquarters in Washington, D.C., from 2016 to early 2020, and virtually in 2021. This project aims to restart the popular workshops by piloting a new "host institution" model, built from a consortium of universities and colleges who see the value in academic leadership development, putting the training program on a long-term path to sustainability.

Lead Cottrell Scholar: Rigoberto Hernandez, Chemistry, Johns Hopkins University
Co-leads: Karen Bjorkman, Astronomy, University of Toledo, and Peter Dorhout, Chemistry, Iowa State University
In collaboration with additional Cottrell Scholars:
Stephen Bradforth, Chemistry, University of Southern California
Seth Cohen, Chemistry, University of California, San Diego
Jen Heemstra, Chemistry, Washington University in St. Louis
Michael Hildreth, Physics, University of Notre Dame
Adam Leibovich, Physics, University of Pittsburgh
George Shields, Chemistry, Furman University

*CONTOUR-A: Cross-Organizational Network for Tools to Optimize Undergraduate Research in Astronomy*
Unprecedented growth in the number of astronomy and physics majors at colleges and universities across the country has challenged the ability of STEM faculty to provide inclusive access to genuine, in-depth undergraduate research experiences, and to support students in building the valuable skills, such as coding and public speaking, that research naturally develops. This collaboration of Cottrell Scholars in astronomy and physics from research universities and primarily undergraduate-serving institutions aims to evaluate and curate a repository of teaching materials and resources that can be shared widely to help stretched-thin faculty accommodate growing student needs.

Lead Cottrell Scholar: Rachel Bezanson, Astronomy, University of Pittsburgh
In collaboration with additional Cottrell Scholars:
Darcy Barron, Physics, University of New Mexico
Laura Blecha, Physics, University of Florida
Laura Chomiuk, Astronomy, Michigan State University
Ilse Cleeves, Astronomy, University of Virginia
Kate Follette, Astronomy, Amherst College
Carla Fröhlich, Physics, North Carolina State University
Eilat Glikman, Physics, Middlebury College
Vera Gluscevic, Astronomy, University of Southern California
Britt Lundgren, Astronomy, University of North Carolina at Asheville
Noel Richardson, Astronomy, Embry-Riddle Aeronautical University
Leslie Rogers, Astronomy, University of Chicago
Ryan Trainor, Astronomy, Franklin & Marshall College
Jessica Werk, Astronomy, University of Washington
Gail Zasowski, Astronomy, University of Utah

*Hidden Figures in Physics and Astronomy: Highlighting Scientists from Marginalized Backgrounds in Course Lectures*
Learning about the contributions of historically marginalized physicists and astronomers can help foster a

sense of belonging among students from those groups, increasing their retention in STEM studies. It can also create a more holistic and diverse view of scientists among people outside STEM fields. This collaborative aims to create an online, searchable catalog of information about diverse role models in science to help instructors at the high school and college levels more easily incorporate into their lectures the contributions of Black, brown, women, LGBTQ+, people with disabilities, and others who may not be well known.

Lead Cottrell Scholar: Javier Duarte, Physics, University of California, San Diego
In collaboration with additional Cottrell Scholars:
Kathy Aidala, Physics, Mount Holyoke College
Mario Affatigato, Physics, Coe College
Wen-fai Fong, Astronomy, Northwestern University
Mark Ilton, Physics, Harvey Mudd College
Catherine Kealhofer, Physics, Williams College
Lydia Kisley, Physics, Case Western Reserve University
Ryan Trainor, Astronomy, Franklin & Marshall College
Gail Zasowski, Astronomy, University of Utah

*Lead Better, Disrupt Barriers, and Have an Impact*
Bringing change to academia can be a slow and complex process, but Cottrell Scholar Collaboratives and leadership workshops have helped advance the community's efforts. Over the years, many Cottrell Scholars have taken on positions of administrative leadership, while others have become academic leaders with networks and abilities to get things done. This project aims to craft a book on best practices of leadership, leveraging the experience and promoting the values of the Cottrell Scholar community. The book will be publicly available for download on the RCSA website and distributed at RCSA-supported workshops.

Lead Cottrell Scholar: Jennifer Ross, Physics, Syracuse University
In collaboration with additional Cottrell Scholars and Holland Awardees:
Kathy Aidala, Physics, Mount Holyoke College
Penny Beuning, Chemistry, Northeastern University
Karen Bjorkman, Astronomy, University of Toledo
Linda Columbus, Chemistry, University of Virginia
Charlie Doret, Physics, Williams College
Carla Fröhlich, Physics, North Carolina State University
Jason Gillmore, Chemistry, Hope College
Boyd Goodson, Chemistry, Southern Illinois University Carbondale
Theodore Goodson, Chemistry, University of Michigan
Natalie Gosnell, Physics, Colorado College
Jen Heemstra, Chemistry, Washington University in St. Louis
Rigoberto Hernandez, Chemistry, Johns Hopkins University
Mike Hildreth, Physics, University of Notre Dame

**Malika Jeffries-El**, Chemistry, Boston University
**Adam Leibovich**, Physics, University of Pittsburgh
**Jane Liu**, Chemistry, Pomona College
**Gina MacDonald**, Chemistry, James Madison University
**Alison Patteson**, Physics, Syracuse University
**Rae Robertson-Anderson**, Physics, University of San Diego
**Claire Till**, Chemistry, Humboldt State University
**Rory Waterman**, Chemistry, University of Vermont
**Amanda Wolfe**, Chemistry, University of North Carolina at Asheville

# Cottrell Plus Awards

**SEED (Singular Exceptional Endeavors of Discovery) Awards** are competitive grants to launch new projects in research at $50,000 each or education at $25,000 each.

In 2023, four SEED Award winners (all for research) each received $50,000:

**Tamara Bogdanović**, CS 2016, Georgia Institute of Technology — *Risk and Rewards: Pushing Boundaries with RMHD Simulations of Multimessenger Massive Black Hole Binaries*

**Henriette Elvang**, CS 2013, University of Michigan — *Pushing Boundaries: Unitarity and Coupling Renormalization*

**Mary Putman**, CS 2007, Columbia University — *Mapping Magnetic Fields with Atomic Filaments in Nearby Galaxies*

**Sergei Urazhdin**, CS 2008, Emory University — *Are Correlated Metals Failed Superconductors?*

**STAR (Science Teaching And Research) Awards** recognize the outstanding research and educational accomplishments of Cottrell Scholars and encourage the improvement of science education at American and Canadian universities and colleges. **IMPACT Awards** recognize the work of Cottrell Scholars who have had a national impact in science through their leadership and service activities.

In 2023, STAR Awards of $5,000 went to **Linda Columbus,** CS 2010, University of Virginia, and **T. Daniel Crawford**, CS 2003, Virginia Tech. In 2020, the IMPACT Award of $5,000 went to **Mark Bussell**, CS 1994, Western Washington University.

# Holland Awards

Six senior scientists with impressive records of scholarship, leadership, and impact received the inaugural **Robert Holland Jr. Award** for Research Excellence and Contributions to Diversity, Equity and Inclusion. The awards welcome recipients as full members of the Cottrell Scholar community and come with a $5,000 cash prize.

**Raychelle Burks**, Chemistry, American University
**Luis Colón**, Chemistry, University at Buffalo
**Robert Gilliard**, Chemistry, Massachusetts Institute of Technology
**Ted Goodson**, Chemistry, University of Michigan
**Malika Jeffries-El**, Chemistry, Boston University
**Jane Liu**, Chemistry, Pomona College

# Cottrell Postbac Awards

RCSA offered a second year of these awards to strengthen Cottrell Scholar research programs disrupted by the pandemic. Seven Cottrell Scholars received awards of $50,000 to provide undergraduate seniors working under their supervision the opportunity to continue a research project for a year after graduation.

**Fadi Bou-Abdallah** (postbac **Maximilian Beyer**)
Chemistry, SUNY Potsdam
*Development of a Colorimetric Sensor Based on Gold Nanoparticles for the Detection of Proteins and Toxic Metals*

**David Egolf** (postbac **Nicolas Bocock**)
Physics, Georgetown University
*Nonlinear Dynamical Analysis of Epiphanies in Deep Learning*

**John Gibbs** (postbac **Kodie Rodman**)
Physics, Northern Arizona University
*Topologically Induced Surface Plasmon Resonances in Hybrid Nanomaterials*

**Lelia Hawkins** (postbac **Eleanor Bentley**)
Chemistry, Harvey Mudd College
*Supporting the Creation of the US Atmospheric Science and Chemistry mEasurement NeTwork (ASCENT)*

**Aaron Leconte** (postbac **Marcell Simon**)
Chemistry, Scripps College
*High-throughput Approaches to Biochemically Characterizing the C-terminal Domain of Firefly Luciferase*

**Tyler Luchko** (postbac **Noah Pishaki**)
Physics, California State University, Northridge
*Investigating the Effects of Low Ion Concentration on RNA Stability with Hybrid Monte Carlo and the Molecular Theory of Solvation*

**Rae Robertson-Anderson** (postbac **Maya Hendija**)
Physics, University of San Diego
*Interdisciplinary Collaborative Research to Create Force-generating Bio-synthetic Materials and Build a Foundation for a Career in Industry*

# Cottrell Scholar Regional Meetings

RCSA makes funds available to Cottrell Scholars who wish to host one-day regional meetings at their institutions to discuss research, teaching, and career development. In 2023, RCSA awarded $5,000 for one regional meeting.

**Rae Robertson-Anderson**, Physics, University of San Diego
*Frontiers of Soft Matter and Macromolecular Networks*

# Scialog Collaborative Innovation Awards

The Scialog program was created in 2010 by RCSA, which oversees its administration. Scialog — short for "science + dialog" — funds early career scientists to pursue transformative research with their fellow grantees on crucial issues of scientific inquiry. Scialog initiatives are a multi-year thematic investment, in which around 50 early career Scialog Fellows, facilitated by a group of leading scientists, convene annually to discuss cutting-edge multidisciplinary themes and propose high-risk collaborative projects. Through Scialog Collaborative Innovation Awards, RCSA along with its funding partners provided a total of $6,293,500 in seed funding for collaborative team projects. Individual awards are $50,000 each in direct costs. RCSA convened six Scialog conferences in 2023.

# Signatures of Life in the Universe (Year 3)

**Goal:** To catalyze cutting-edge research with the potential to transform our understanding of the habitability of planets, of how the occurrence of life alters planets and leaves signatures, and of how to detect such signatures beyond Earth.

**Morgan Cable**, Planetary Science, NASA Jet Propulsion Laboratory / California Institute of Technology [4]
**Nagissa Mahmoudi**, Earth & Planetary Sciences, McGill University [1]

*The Power is in the Poop: Experimental Investigation of Microbially-Generated Organics as a Biosignature for Ocean Worlds*

**Jennifer Bergner**, Chemistry, University of California, Berkeley [1]
**Christopher Glein**, Space Science Division, Southwest Research Institute [1]
**Renyu Hu**, Astrophysics & Space Sciences, Jet Propulsion Laboratory [4]
*A Close Look at the Habitability of Water Worlds*

**Marc Neveu**, Astronomy / Planetary Environments Laboratory, University Maryland/NASA Goddard Space Flight Center [4]
**Malena Rice**, Astronomy, Yale University [1]
**Leslie Rogers**, Astronomy & Astrophysics, University of Chicago [1]
*Investigating the Biological Potential of Moons in the Uranus System*

**Peter Gao**, Earth and Planets Laboratory, Carnegie Institution for Science [1]
**Renyu Hu**, Astrophysics & Space Sciences, Jet Propulsion Laboratory [4]
**Chenguang Sun**, Geological Sciences, University of Texas at Austin [1]
*Constraining Volatile Budgets in Small Exoplanets through Coupled Petrological and Atmospheric Modeling and Observations*

**Greg Fournier**, EAPS, Massachusetts Institute of Technology [1]
**Morgan Raven**, Earth Science, University of California, Santa Barbara [2]
*Sulfur Assimilation: A Novel Proxy for Redox Transitions in the Early Biosphere*

**Bradford Foley**, Geosciences, Pennsylvania State University [2]
**Sukrit Ranjan**, Planetary Sciences, University of Arizona [3]
**Rebecca Rapf**, Chemistry, Trinity University [3]
**Morgan Raven**, Earth Science, University of California, Santa Barbara [2]
*Constraining the Abiotic Sulfur Cycle on Temperate Terrestrial Planets*

**Tyler Robinson**, Lunar and Planetary Laboratory, University of Arizona [2]
**Amanda Stockton**, Chemistry and Biochemistry, Georgia Institute of Technology [2]
*Irradiated Sea Spray Aerosol Generation and Analysis Under Early Earth Atmospheres*

**Paul Bracher**, Chemistry, Saint Louis University [1]
**Christopher Hamilton**, Lunar and Planetary Laboratory, University of Arizona [1]
*Rocky Roads: Flow Pathways and Chemical Evolution in Vesicular Lava and Pumice*

[1] Funded by Heising-Simons Foundation
[2] Funded by RCSA
[3] Funded by The Kavli Foundation
[4] Funded by NASA

# Microbiome, Neurobiology and Disease (Year 3)

**Goal:** To catalyze interdisciplinary teams including chemists, physicists, biologists and neurophysiologists to collaborate on new projects to advance fundamental understanding of the gut-brain axis and the roles microbiota play in neurodegenerative disorders.

**Abhishek Shrivastava**, Life Sciences, Arizona State University
**Kai Zhang**, Biochemistry, University of Illinois at Urbana-Champaign
*Could Feces be Used as a Natural Time Capsule for Mapping of Signal-Generating Hubs within the Gut?*

**Will Ludington**, Embryology, Carnegie Institution
**Karthik Shekhar**, Chemical & Biomolecular Engineering / Helen Wills Neuroscience Institute, University of California, Berkeley
*How Does the Microbiome-Gut-Brain Cascade Activate Glia? A Single-Cell Transcriptomic and Functional Roadmap in the Fruit Fly*

**Mei Shen**, Chemistry, Neuroscience Program, Beckman Institute, University of Illinois at Urbana Champaign
**Heather Bean**, Life Sciences, Arizona State University
**Yanjiao Zhou**, Medicine, UConn Health
*Investigating the Influence of Air Pollution VOCs on Alzheimer's Disease-Like Pathology*

**Chun-Jun Guo**, Medicine, Weill Cornell Medical College
**Yanjiao Zhou**, Medicine, UConn Health
**Annie Ciernia**, Biochemistry & Molecular Biology, University of British Columbia
*Decipher the "Molecular Language' between Microbiota-Microglia Crosstalk Using a Genetically Tractable Microbiome*

**Annie Ciernia**, Biochemistry & Molecular Biology, University of British Columbia
**Christopher Whidbey**, Chemistry, Seattle University
*Identification of Microglial Receptors for Microbiota Derived Metabolites*

**Stephanie Cologna**, Chemistry, University of Illinois at Chicago [1]
**Leah Pyter**, Psychiatry, Ohio State University
*The Role of Gut Metabolites in "Chemobrain"*

**Sarah MacEachern**, Pediatrics, University of Calgary
**Kendall Corbin**, Horticulture, University of Kentucky
**Heather Bean**, Life Sciences, Arizona State University
*Embracing Complexity: Exploring the Connections between Chronic Fatigue, Behavior, and Gut Microbiome Dysbiosis in Children with Neurodevelopmental Disorders*

**Dhara Shah**, Mathematical & Natural Sciences, Arizona State University
**Santiago Cuesta**, Cell Biology and Neuroscience, Rutgers University
*Gut Catecholamine Levels as Modulators of Addiction Behaviors*

[1] **Funded by Walder Foundation**
**Others funded by RCSA, the Paul G. Allen Frontiers Group, and the Frederick Gardner Cottrell Foundation.**

# Advancing BioImaging (Year 3)

**Goal:** To catalyze early career chemists, physicists, biologists, bioengineers and medical imaging specialists to collaborate on new and innovative projects to accelerate the development of the next generation of imaging technologies.

**Eszter Boros**, Chemistry, University of Wisconsin - Madison [1]
**Shiva Abbaszadeh**, Electrical and Computer Engineering, University of California, Santa Cruz [1]
*PETinIVIS: A Modular PET Insert to Enable Simultaneous Acquisition of Optical and PET Imaging Data in Small Animals*

**Shwetadwip Chowdhury**, Electrical and Computer Engineering, University of Texas at Austin [2]
**Heather M. Whitney**, Radiology, University of Chicago [3]
*Developing Multi-Angle Synthesized Ultrasound Tomography*

**Dylan McCreedy**, Biology, Texas A&M University, College Station [1]
**Fanny Chapelin**, Bioengineering, University of California, San Diego [1]
*Specific and Quantitative MRI Imaging for Longitudinal Cell Fate Tracking*

**Seunghyun (Seu) Sim**, Chemistry, University of California, Irvine [1]
**Ruixuan Gao**, Chemistry and Biological Sciences, University of Illinois at Chicago [3]
**Shawn Davidson**, Medicine, Northwestern University [1]
*Quantitative, Spatially Resolved Analysis of Single-Cell and Single-Organelle Metabolism*

**Yi-Chih Lin**, Chemistry, University of Texas at Austin [2]
**Nick Galati**, Biology, Western Washington University [2]
**Lingyan Shi**, Bioengineering, University of California, San Diego [2]
*Exploring the Mechano-Metabolic Landscape of a Beating Ciliary Array*

**Dylan McCreedy**, Biology, Texas A&M University, College Station [2]
**Meghan Driscoll**, Pharmacology, University of Minnesota Twin Cities [2]
*Sketch-Based Retrieval and Clustering of Neurons in Large Microscopy Data*

**Scott Cushing**, Chemistry and Chemical Engineering, California Institute of Technology [2]
**Jing Liu**, Physics, Purdue University [2]
*Quantum-Enhanced Fluorescent Imaging with Entangled Photons*

**Lei Tian**, Electrical and Computer Engineering, Boston University [2]
**Ryan J. McGorty**, Physics and Biophysics, University of San Diego [2]
*3D Dynamics Quantification with Differential Dynamic Light-Field Microscopy*

**Rosario Porras-Aguilar**, Physics & Optical Sciences, University of North Carolina at Charlotte [1]
**Divita Mathur**, Chemistry, Case Western Reserve University [1]
*Beam Shaping Metasurfaces Using DNA Alignment and Liquid Crystals*

[1] Funded by RCSA and the Frederick Gardner Cottrell Foundation
[2] Funded by CZI
[3] Funded by Walder Foundation

# Mitigating Zoonotic Threats (Year 3)

**Goal:** To catalyze multidisciplinary teams of early career scientists to launch new research in the detection and mitigation of emerging animal-borne infectious diseases.

**Tavis Anderson**, Virus and Prion Research Unit, USDA/ARS
**Louise Moncla,** Pathobiology, University of Pennsylvania
**Nicholas DeFelice**, Environmental Medicine & Public Health, Mount Sinai School of Medicine
*When Pigs Fly: Animal Movement Networks to Project Spillovers*

**Angela Arenas**, Veterinary Pathobiology, Texas A&M University, College Station
**Nicholas Wu**, Biochemistry, University of Illinois at Urbana-Champaign
**Crystal Reid**, Center for Veterinary Biologics — Virology, USDA/APHIS
*From Discovery to Field: Improving Diagnostic Assay Accuracy by Protein Engineering*

**Dan Peach**, Savannah River Ecology Lab & Department of Infectious Disease, University of Georgia
**Stacey Scroggs**, Arthropod Borne Animal Diseases Research Unit, USDA/ARS
**Gonzalo Vazquez-Prokopec**, Environmental Sciences, Emory University
*Nectar of the Gods: Impact of Flower Nectar on Mosquito Longevity and Virus Transmission*

**Michael Schulz**, Chemistry, Virginia Polytechnic Institute and State University
**Louise Moncla**, Pathobiology, University of Pennsylvania
*To Catch a Virus: Decoy Polymers and Influenza's Evolutionary Response*

**Nsa Dada**, Life Sciences, Arizona State University
**Bethany McGregor**, Arthropod Borne Animal Diseases Research Unit, USDA/ARS
**Patricia Calvo**, Chemistry, Kansas State University
*Novel Insecticide Delivery and Formulation for Resistance Management in Zoonotic Disease Vecto*rs

**Liliana Salvador**, Animal and Comparative Biomedical Sciences, University of Arizona
**Catalina Picasso Risso**, Large Animal Clinical Sciences, Michigan State University
**Timothy Smyser,** National Wildlife Research Center, USDA/APHIS
**Anni Yang**, Geography and Environmental Sustainability, University of Oklahoma
*Development of an Integrative Approach to Enhance Surveillance Sensitivity Systems for Wildlife Spillover of Bovine Tuberculosis: Wild Pig Case Study*

**Funded by RCSA and USDA.**

# Molecular Basis of Cognition (Year 2)

**Goal:** To catalyze teams of researchers working across disciplines, including neurobiology, neuroscience, and related cognitive sciences, to devise new ways to probe the chemistry, biology, physics, and computational science that underlie memory and other cognitive processes.

**Yao Chen**, Neuroscience, Washington University in Saint Louis
**Michael Economo**, Biomedical Engineering, Boston University
*Illuminating the Molecular Mechanisms of Memory Formation during Behavior*

**Anna Schapiro**, Psychology, University of Pennsylvania
**Megan Peters**, Cognitive Sciences, University of California, Irvine
**Marcelo Mattar**, Psychology, New York University
*Investigating the Conscious Accessibility of Neural Replay*

**Timothy Machado**, Neuroscience, University of Pennsylvania
**Kate Hong**, Biological Sciences, Neuroscience Institute, Carnegie Mellon University

**Michael Economo**, Biomedical Engineering, Boston University
*FLEX: Fluorescent Light Examination of eXtensors (and Other Muscles)*

**Lucas Pinto**, Neuroscience, Northwestern University
**Benjamin Scott**, Psychological and Brain Sciences, Boston University
**Yao Chen**, Neuroscience, Washington University in Saint Loui
*Understanding the Multiple Timescales of Neuromodulation using Three Photon Instant FLIM*

**Daniel Burnston**, Philosophy / Brain Institute, Tulane University
**Wilma Bainbridge**, Psychology, University of Chicago
**Bob Wilson**, Psychology, University of Arizona
*Mapping Inner Worlds: Representational Spaces and Mental Life*

**Phillip Rivera**, Biology, Macalester College
**Alison Weiss**, Neuroscience, Oregon Health & Science University
**Elizabeth McNeill**, Food Science and Human Nutrition, Iowa State University
*The Mystery of Heavy Drinking: Exploring the Roots of Alcohol Dependency*

**Maithe Arruda-Carvalho**, Psychology, University of Toronto
**Rosemary Bagot**, Psychology, McGill University
*Leveraging Development to Reveal Molecular Mechanisms of Neural Circuit Divergence*

**Funded by RCSA, the Frederick Gardner Cottrell Foundation, the Azrieli Foundation, The Kavli Foundation, and Walder Foundation.**

# Negative Emissions Science (Year 4)

**Goal:** To catalyze chemists, engineers, environmental scientists and those in related fields to collaborate on innovative projects to advance fundamental understanding of capturing and utilizing or sequestering carbon and other greenhouse gases in the atmosphere and oceans.

**Fani Boukouvala**, Chemical & Biomolecular Engineering, Georgia Institute of Technology [2]
**Kyriakos Stylianou**, Chemistry, Oregon State University [2]
**Liang Feng**, Mechanical Engineering and Materials Science, Duke University [2]
*Understanding, Quantifying and Mitigating Adsorbent Degradation: From Fundamental Understanding to Techno-economic Analysis*

**Rachel Davidson**, Chemistry and Biochemistry, University of Delaware [2]
**Michael Ross**, Chemistry, University of Massachusetts Lowell [2]
**Wen Song**, Center for Subsurface Energy and the Environment, University of Texas at Austin [2]
*ML-ROCKS: Machine Learning Reaction Optimization of Carbonation KineticS*

**Douglas Reed**, Chemistry, University of Washington [3]
**Eva Nichols**, Chemistry, University of British Columbia [3]
**Xin Xu**, The Polytechnic School, Arizona State University [3]
*Gas Capture by Tuning Electric Fields in Conductive MOFs*

**Michael Ross**, Chemistry, University of Massachusetts Lowell [1]
**Ariel Furst**, Chemical Engineering, Massachusetts Institute of Technology [1]
**Joshua Jack**, Civil & Environmental Engineering, University of Michigan [1]
*Cow Burps to Butanol: Bio-electrocatalytic Valorization of Methane to Butanol*

**Zhe Qiang**, Polymer Science and Engineering, University of Southern Mississippi [2]
**Marc Porosoff**, Chemical Engineering, University of Rochester [2]
**Yuan Yao**, School of the Environment, Yale University [2]
*Modular Production of Aviation Fuel from Point Source Biogas Via Zoned Joule Heating*

**Benjamin Snyder**, Chemistry, University of Illinois at Urbana-Champaign [1]
**Caroline Saouma**, Chemistry, Virginia Polytechnic Institute and State University [1]
**Yuzhang Li**, Chemical and Biomolecular Engineering, University of California, Los Angeles [1]
*Achieving Speed and Scale: Self-Amplifying Adsorbents for Negative Carbon Emissions*

**Rebecca Ciez**, Mechanical Engineering & Environmental and Ecological Engineering, Purdue University [2]
**Michael McGuirk**, Chemistry, Colorado School of Mines [1]
*Plastic Waste to DAC: A Study of the Chemical and Lifecycle Feasibility of Converting Polyolefin Waste to Aminopolymers for Direct Air Capture*

1 Funded by RCSA
2 Funded by the Alfred P. Sloan Foundation
3 Funded by ClimateWorks Foundation

*(Summary includes award commitments made in 2023. Due to award terms and timing, totals may not be reflected in audited 2023 financial statements.)*

# RCSA's Commitment to Diversity, Equity & Inclusion

RCSA believes that to promote groundbreaking science, we must welcome, engage, and nurture the brightest minds from the widest range of backgrounds, institutions, and life experiences. RCSA is proud of the efforts we have made to support wider diversity in the physical sciences, including our **RCSA Fellows** initiative, which aims to increase faculty diversity in the physical sciences through job search preparation and community building.

# About RCSA

Research Corporation for Science Advancement was founded in 1912 and is the second-oldest foundation in the United States (after the Carnegie Corporation) and the oldest foundation for science advancement. RCSA seeks to advance early stage, high-potential, basic scientific research by creating and supporting inclusive communities of early career researchers in the physical sciences and closely related fields at colleges and universities across the United States and Canada.

RCSA has six conferences scheduled for 2024 in Tucson, Arizona.

**April 11-14** — Scialog: Automating Chemical Laboratories
**May 21-23** — RCSA Fellows Conference
**July 17-19** — Cottrell Scholar Conference
**Sept. 4-7** — Scialog: Sustainable Minerals, Metals, and Materials
**Oct. 24-27** — Scialog: Molecular Basis of Cognition
**Nov. 14-17** — Scialog: Early Science with the LSST

Nominations for early career faculty to participate in Scialogs as Fellows, or senior faculty to serve as Scialog Facilitators, are welcome from colleagues, department heads, deans, vice presidents for research, or provosts. Institutions should also encourage eligible faculty (those in their third year with budgetary or courtesy appointments in chemistry, physics, or astronomy) to apply for the Cottrell Scholar Award. Members of the RCSA community who are Cottrell Scholars or Scialog Fellows or Facilitators are encouraged to learn more about how they can participate in the RCSA Fellows Initiative.

To learn more about RCSA and its programs, visit **rescorp.org** or contact:


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