The Future of Science

RESEARCH CORPORATION
for **SCIENCE ADVANCEMENT**
A foundation dedicated to science since 1912.

Summary of 2022 Awards

Research Corporation for Science Advancement (RCSA) 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 – developing outstanding teacher-scholars recognized by their scientific communities for the quality of their research programs, innovation in education, and potential for academic leadership. In 2022, Cottrell Scholar Program funding included $2,400,000 for 24 initial Cottrell Scholar Awards, $70,000 for Cottrell Scholars Collaborative Awards, and $265,000 for eight Cottrell Plus Awards, which include the competitive SEED, STAR and IMPACT awards. A new initiative, Cottrell Postbac Awards, awarded $450,000 to nine Cottrell Scholars, and one Cottrell Scholar received $5,000 to fund a regional meeting.

2022 total: $3,190,000

Scialog – promoting dialogue and community-building to catalyze transformational science through collaborative, interdisciplinary research. In 2022, RCSA awarded $1,031,000 to early career scientists for research through Scialog Collaborative Innovation Awards. Partner philanthropies -- which in 2022 included the Paul G. Allen Frontiers Group, the Canadian Institute for Advanced Research (CIFAR), the Chan Zuckerberg Initiative, the 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 $5,009,250 toward Scialog awards.

2022 total: $6,040,250.

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.

2022 Cottrell Scholar Awards

Darcy Barron, physics, University of New Mexico – *Enabling Discoveries in Fundamental Physics by Maximizing the Sensitivity of Cosmic Microwave Background Polarization Surveys from Chile*

Carl Brozek, chemistry, University of Oregon – *Clean Water from Porous Nanocrystals: An Undergraduate Training Program in Soft Skills and Sustainable Materials*

Ilse Cleeves, astronomy, University of Virginia – *Identifying Molecular Patterns that Reveal the Chemistry of Planet Formation*

Scott Cushing, chemistry, California Institute of Technology – *The Role of Picosecond Correlations in Solid-State Electrolytes for Batteries*

Ryan Davis, chemistry, Trinity University – *Chemistry Beyond the Beaker: Exploring Supramolecular Assembly in Aqueous Microdroplets and Addressing Inequities in Chemical Education*

Serena Eley, physics, Colorado School of Mines – *Identifying the Microscopic Origins of Energy Loss Mechanisms in Superconducting Quantum Circuits through Defect Landscape Engineering*

Ben Feldman, physics, Stanford University – *Thermodynamic Characterization of Metal-insulator Transitions in Dual Gated Moiré Superlattices*

Kate Follette, astronomy, Amherst College – *Moving Forward – Towards Accurate Recovery and Interpretation of Accreting Protoplanets and a Socially Just Undergraduate Astronomy Curriculum*

Wen-fai Fong, astronomy, Northwestern University – *Toward the Next Breakthroughs in Time-Domain Astronomy: The Origins of Fast Radio Bursts*

Stephen Fried, chemistry, Johns Hopkins University – *Bringing New Life to Prebiotic Peptide Chemistry and to the Physical Chemistry Curriculum*

Ryan Hadt, chemistry, California Institute of Technology – *Research: Learning How to Engineer Spin-Phonon Coupling in Molecules and Materials; Educational: Tackling Theoretical Topics in Inorganic Chemistry: A Worked Example Approach*

Christine Hagan, chemistry, College of the Holy Cross – *Mechanistic Studies of Protein Toxin Delivery by Bacterial Contact-Dependent Inhibition Systems*

Sarah Keane, chemistry, University of Michigan – *RNA Matchmaker: The Role of Loops and Mismatches in RNA Processing*

Daniel Keedy, chemistry, CUNY Advanced Science Research Center & City College of New York – *Illuminating Structural Motions that Underlie Allostery in Dynamic Phosphatase Enzymes*

Michael Larsen, chemistry, Western Washington University – *Diverse N-Functionalized Polyureas by Cationic Ring-Opening Polymerization of Iminooxazolidines*

Lauren Marbella, chemistry, Columbia University – *Tracking (Electro)Chemical Reduction at Electrode/Electrolyte Interfaces with Operando NMR*

Krystle McLaughlin, chemistry, Vassar College – *Structural Basis for the Conjugative Spread of Antibiotic Resistance*

Jorge Muñoz, physics, University of Texas at El Paso – *Fast and Accurate Computation of Anharmonic Phonons in Polymorphic Materials*

Lisa Olshansky, chemistry, University of Illinois at Urbana-Champaign – *Exploring and Exploiting Conformational Dynamics for Proton-Coupled Electron Transfer*

Zachariah Page, chemistry, University of Texas at Austin – *Color-Coded Orthogonal Photochemistry from a Single Dye & Guiding Student Mindsets in Organic Chemistry*

Amanda Patrick, chemistry, Mississippi State University – *Winnowing the Possible Identities of Metabolomics "Features" by Hydrogen-Deuterium Exchange Mass Spectrometry*

Orit Peleg, physics, University of Colorado Boulder – *The Physics of Firefly Communications: Principles and Predictions*

Aurora Pribram-Jones, chemistry, University of California, Merced – *Reframing Interaction in Quantum Mechanical Ensembles and Across Chemistry Learning Communities*

Ryan Trainor, astronomy, Franklin & Marshall College – *Feedback in the Circumgalactic Medium Probed with Lyman-alpha Emission*

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 this Cottrell Scholars Collaborative program, RCSA gave awards of up to $25,000 each to four projects in 2022 to support efforts to improve undergraduate and graduate-level science education:

Supporting Making to Align Research and Teaching (SMART): A Cottrell Collaborative

This project builds off an existing Cottrell collaborative project aiming to increase awareness of making, an emerging instructional practice where students learn a discipline (and enjoy enhanced creativity and self-espression) by creating shared physical and digital artifacts. The goal of this project is to support and document faculty training and adoption of making methods, as well as to generate examples of making activities in disciplines, such as chemistry and astronomy, that have not adopted this technique.

Lead Cottrell Scholar: Tim Atherton, physics, Tufts University
In collaboration with additional Cottrell Scholars:
Elisabetta Matsumoto, physics, Georgia Institute of Technology
Carl Brozek, chemistry, University of Oregon
Charles Doret, physics, Williams College
Ben Feldman, physics, Stanford University

Infusing Computational Science Concepts into STEM Courses through Multidisciplinary Instructor Collaborative Networks

This project follows on a previous Cottrell Scholar Collaborative effort, *Enhancing Science Courses by Integrating Python (ESCIP)*. The new project aims to create a centralized web resource based on the materials developed by faculty who attended ESCIP workshops virtually in 2020 and in-person in 2022. This resource will enable STEM faculty to collaboratively create and manage educational materials, including notebooks, exercise databases, and best practices guides.

Lead Cottrell Scholar: Davit Potoyan, chemistry, Iowa State University
In collaboration with additional Cottrell Scholars:
Tim Atherton, physics, Tufts University
Justin Caram, chemistry, University of California, Los Angeles
Jay Foley, chemistry, University of North Carolina, Charlotte
Geoff Hutchinson, chemistry, University of Pittsburgh
Daniel Keedy, chemistry, City College of New York
Casey Londergan, chemistry, Haverford College
Tyler Luchko, physics, California State University, Northridge
Britt Lundgren, astronomy, University of North Carolina, Ashville
Dennis Perepelitsa, physics, University of Colorado, Boulder
Brenda Rubenstein, chemistry, Brown University
Brian Shuve, physics, Harvey Mudd
Juliane Simmchen, chemistry, Technische Universität Dresden
Grace Stokes, chemistry, Santa Clara University
Ruby Sullan, chemistry, University of Toronto, Scarborough
Christina Vizcarra, chemistry, Barnard College

Lowering Activation Barriers to Success in PChem (LAB-SIP): Towards Better Access to Creative Practice for Students in a Re-envisioned and Re-invigorated Physical Chemistry Curriculum

This project seeks to establish a community framework to rethink and redesign the intimidating and popularly

stigmatized physical chemistry curriculum that is taught in most undergraduate chemistry programs in the United States. This collaborative, which envisions more flexible and outcomes-oriented PChem courses that would better serve students of all backgrounds, plans to organize a workshop to identify needs and establish consensus around learning objectives for PChem courses, build on the results of the workshop, and provide shared resources and concrete guidelines to support curricular transition.

Lead Cottrell Scholar: Casey Londergan, chemistry, Haverford College
In collaboration with additional Cottrell Scholars:
Carlos Baiz, chemistry, University of Texas at Austin
Rob Berger, chemistry, Western Washington University
Linda Columbus, chemistry, University of Virginia
Julio de Paula, chemistry, Lewis & Clark College
Kelling Donald, chemistry, University of Richmond
Stephen Fried, chemistry, Johns Hopkins University
Dmitri Kosenkov, chemistry, Monmouth University
Brenda Rubenstein, chemistry, Brown University
Grace Stokes, chemistry, Santa Clara University
Kana Takematsu, chemistry, Bowdoin College

The Cottrell Astronomy Network: Collecting and Distributing Resources to Support Undergraduate Astronomy Student Success
Ten Cottrell Scholars in astronomy and physics, facing increased student demand for genuine, in-depth research experiences but a lack of important resources (including time) to accommodate them, formed an informal collaboration at this year's Cottrell Scholar Conference to pool student-focused educational resources they had developed. This group will convene in conjunction with next year's conference to lay the groundwork for a summer undergraduate research exchange program and other efforts to share and scale creative solutions in educating a growing number of astronomy and physics students.

Lead Cottrell Scholar: Jessica Werk, astronomy, University of Washington
In collaboration with additional Cottrell Scholars:
Darcy Barron, physics, University of New Mexico
Rachel Bezanson, astronomy, University of Pittsburgh
Laura Blecha, physics, University of Florida
Laura Chomiuk, astronomy, Michigan State University
Carla Fröhlich, physics, North Carolina State University
Eilat Glikman, astronomy, Middlebury College
Britt Lundgren, astronomy, University of North Carolina, Ashville
Leslie Rogers, astronomy, University of Chicago
Ryan Trainor, astronomy, Franklin & Marshall College

Cottrell Plus Awards

As their scientific careers advance, Cottrell Scholars are eligible to receive post-tenure Cottrell Plus Awards to further support their research and educational activities. In 2022, SEED, STAR and IMPACT awards were given.

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 2022, five SEED Award winners (all for research) each received $50,000:

Stephen Bradforth, CS 1999, University of Southern California – *Role of Flanking Bases and Secondary Structure in Thymine Dimer Formation*

Luis Campos, CS 2015, Columbia University – *Carbon Dioxide Click Chemistry*

Nancy Makri, CS 1994, University of Illinois at Urbana-Champaign – *Real-Time Path Integral Studies of Cavity-Controlled Exciton Dynamics*

Ken Mills, 2003, College of the Holy Cross – *Folding Inhibitors of Inteins: A Novel Drug Target*

Art Winter, CS 2013, Iowa State University – *Laboratory Photosynthesis of Oligosaccharides: Towards Glycan Chips*

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. In 2022, STAR Awards of $5,000 went to:

Rae Robertson-Anderson, CS 2010, University of San Diego
Scott Snyder, CS 2009, University of Chicago

IMPACT Awards recognize the work of Cottrell Scholars who have had a national impact in science through their leadership and service activities. In 2020, the IMPACT Award of $5,000 went to:

Seth Cohen, CS 2004, University of California, San Diego

Cottrell Postbac Awards

RCSA offered these awards to strengthen Cottrell Scholar research programs disrupted by the pandemic. Nine 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.

Jeanine Amacher (postbac **Jadon Blount**)
Chemistry, Western Washington University
Molecular Dynamics Simulations of Sortase Enzymes

John Gilbertson (postbac **Allison Teigen**)
Chemistry, Western Washington University
Reduction of the Pervasive Environmental Pollutants Nitrate/Nitrite via Redox-Active Complexes

Ryan McGorty (postbac **Philip Neill**)
Physics, University of San Diego
Micro- and Macro-rheology of Topologically-active DNA-based Materials

Cedric Owens (postbac **Kellie Omori**)
Chemistry, Chapman University
The Activation Heat Capacity of Enzymatic Catalysis is a New Target for Protein Engineering

Katherine Plass (postbac **Qi Luo**)
Chemistry, Franklin & Marshall College
Post-synthetic Transformation of Copper Sulfide Nanoparticles to Design Novel Multicomponent Nanoparticles

Grace Stokes (postbac **Elliott Anderson**)
Chemistry, Santa Clara University
Surface Characterization of Peptoids at the Liquid/Air Interface

David Strubbe (postbac **Elsa B. Vazquez**)
Physics, University of California, Merced
Raman Spectroscopy and Friction in Doped 2D Materials

Adam Urbach (postbac **Sara Trauth**)
Chemistry, Trinity University
Supramolecular Controlled Release of Protein Drugs

Rory Waterman (postbac **Evan Beretta**)
Chemistry, University of Vermont and State Agricultural College
Phosphinidene Transfer Reactions to Launch a Career in Research

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 2022, RCSA awarded $5,000 for one regional meeting.

Grace Stokes, chemistry, Santa Clara University
Enhancing Science Courses by Integrating Python (ESCIP) Workshop

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 $6,040,250 in seed funding for collaborative team projects. Individual awards are $50,000 each in direct costs. RCSA convened six Scialog conferences in 2022.

Microbiome, Neurobiology and Disease (Year 2)

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.

Elizabeth Bess, Chemistry, University of California, Irvine *
Aida Ebrahimi, Electrical Engineering and Biomedical Engineering, Pennsylvania State University *
Electrifying Mechanisms of Intestinal α-Synuclein Aggregation in Parkinson's Disease Onset

Annika Barber, Molecular Biology and Biochemistry, Rutgers University *
David Durgan, Anesthesiology, Baylor College of Medicine *
Diurnal Rhythms in Microbiota-Gut-Brain Signaling Leads to Time-of-Day Dependent Susceptibility to Stroke

Linnea Freeman, Biology, Furman University *
Gianna Hammer, Immunology, University of Utah *
Lisa Osborne, Microbiology & Immunology, University of British Columbia *
The Intersection of Age, Microbiome and the Zeal for Continuous Learning by Cells of the Neuro-Immune Network

Lisa Osborne, Microbiology & Immunology, University of British Columbia *
Ukpong Eyo, Neuroscience, University of Virginia *
Understanding the Protective Effect of Helminth Immunotherapy Through the Lens of the Gut-Brain Axis

Yanjiao Zhou, Medicine, UConn Health *
Ashley Ross, Chemistry, University of Cincinnati *
Unraveling the Effect and Mechanism of Enteric Microbiota-Neuron Communication in Aging

Iliyan Iliev, Medicine, Weill Cornell Medicine *
Faranak Fattahi, Biochemistry and Biophysics, University of California, San Francisco *
Identifying Mycobiome-Derived Enteric Neuromodulators

Elizabeth Bess, Chemistry, University of California, Irvine *
Stephanie Cologna, Chemistry, University of Illinois at Chicago ^
Tracking Alpha-synuclein from Enteroendocrine Cells to the Enteric Nervous System

Advancing BioImaging (Year 2)

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.

Shiva Abbaszadeh, Electrical and Computer Engineering, University of California, Santa Cruz *
Heather Whitney, Radiology, University of Chicago *
Real-time AI for Programmable Training Arrays

Yevgenia Kozorovitskiy, Neurobiology, Northwestern University †
Abdoulaye Ndao, Electrical and Computer Engineering, Boston University ^
Making Lenses Smart for Optical Imaging and Beyond

Joshua Brake, Engineering, Harvey Mudd College *
Kevin Cash, Chemical and Biological Engineering, Colorado School of Mines *
Democratizing Access to Macroscopic Bioimaging

Mark Sellmyer, Radiology, University of Pennsylvania *
Arnab Mukherjee, Chemical Engineering and Biological Engineering, University of California, Santa Barbara *
Improving MRI Detection Limits

Kathryn Keenan, Applied Physics Division, National Institute of Standards and Technology ^
Crystal Rogers, Anatomy, Physiology, and Cell Biology, University of California, Davis ^
Ulugbek Kamilov, Computer Science and Engineering, Washington University in St. Louis ^
MRI with Molecular Specificity for a New Realm of Neurodevelopmental Research

Alexandra Walsh, Biomedical Engineering, Texas A&M University, College Station *
Johannes Schöneberg, Pharmacology and Chemistry & Biochemistry, University of California, San Diego *
4D Imaging and Tracking to Resolve Organelle Form vs. Function

Ying Hu, Chemistry, University of Illinois at Chicago ^
Seunghyun (Seu) Sim, Chemistry, University of California, Irvine ^
Live tissue Clearing of Lymph Nodes Through Programmed Dendritic Cells

Arnold Hayer, Biology, McGill University ^
Rosario Porras-Aguilar, Physics & Optical Sciences, University of North Carolina at Charlotte ^
High-speed 4D Morphodynamic Analysis of Migrating Cells

Luke Mortensen, Regenerative Bioscience Center & School of Chemical, Materials and Biomedical Engineering, University of Georgia *
Huanyu Cheng, Engineering Science and Mechanics, Pennsylvania State University *
Transforming Imaging Collection in the Brain

Stephen Yi, Biomedical Engineering & Oncology, University of Texas at Austin ^
Ruixuan Gao, Chemistry and Biological Sciences, University of Illinois at Chicago †
In Situ Protein Sequencing by Multiplexed Real-Time Single Molecule Imaging

Signatures of Life in the Universe (Year 2)

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.

Katherine de Kleer, Geological and Planetary Sciences, Caltech *
Sarah Hörst, Earth and Planetary Science, Johns Hopkins University *
Sarah Maurer, Chemistry and Biochemistry, Central Connecticut State University *
Enceladus Plume Chemistry: From Lab to Telescope

Aaron Engelhart, Genetics, Cell Biology, and Development, University of Minnesota ^
Fang Liu, Chemistry, Emory University ^
Computational and Experimental Investigations of Martian Brines as Prebiotic Environments

Kate Follette, Physics and Astronomy, Amherst College *
Jeffrey Marlow, Biology, Boston University *
From Exoplanets to Microbes: Using Astronomical Image Processing Techniques to Detect Microbes in Astrobiological Contexts

Paul Bracher, Chemistry, Saint Louis University ^
Ilse Cleeves, Astronomy, University of Virginia *
Brimstone Life: Hypothetical Sulfur Worlds and Their Possible Biosignatures

Eddie Schwieterman, Earth and Planetary Sciences, University of California, Riverside †
Ziming Yang, Chemistry, Oakland University †
Methylated Organometallic Gases as Potential Biosignatures

Nick Cowan, Earth & Planetary Sciences and Physics, McGill University *
Joseph O'Rourke, Earth and Space Exploration, Arizona State University *
Leslie Rogers, Astronomy & Astrophysics, University of Chicago *
Chenguang Sun, Geological Sciences, University of Texas at Austin *
Volatile Reservoirs and the Habitability of M-Earths

Zachary Adam, Geoscience, University of Wisconsin – Madison ^
Fang Liu, Chemistry, Emory University ^
Assessing False Positive Biosignatures and Prebiotic Synthesis Generated by Two Candidate Autocatalytic Reaction Sets of Aqueous Sulfur

Laurie Barge, Planetary Sciences, NASA Jet Propulsion Laboratory ‡
Frances Rivera-Hernández, Earth and Atmospheric Sciences, Georgia Institute of Technology *
Mars Sample Return: Connecting Martian Environmental Geochemistry to Returned Samples

Mitigating Zoonotic Threats (Year 2)

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

Guillaume Bastille-Rousseau, Cooperative Wildlife Research Lab, Southern Illinois University,
Gonzalo Vazquez-Prokopec, Environmental Sciences, Emory University
Measuring and Modeling Mosquito Flight and Movement Behavior at High Spatiotemporal Resolution

Gisselle Medina, National Bio and Agro-Defense Facility, USDA/ARS
Angad Mehta, Chemistry, University of Illinois at Urbana-Champaign
Identifying and Engineering Broadly Neutralizing Antibodies Against African Swine Fever Virus

Nicholas DeFelice, Environmental Medicine and Public Health, Icahn School of Medicine at Mount Sinai
Kimberly A. Lehman, Diagnostics and Biologics, USDA/APHIS Veterinary Services
Sen Pei, Environmental Health Sciences, Columbia University
Impact of Climate Variability on Foreign Animal Disease: Forecasting Highly Pathogenic Avian Influenza

Pilar Fernandez, Paul G. Allen School for Global Animal Health, Washington State University,
Silvie Huijben, Life Sciences, Arizona State University
Incorporating Human Behavioral Systems in Insecticide Resistance Management for Mosquito-Borne Diseases

Daniel Becker, Biology, University of Oklahoma
Claudia Herrera, Tropical Medicine, Tulane University
Steven M. Lakin, National Bio and Agro-Defense Facility, USDA/APHIS
Metagenomic-guided Tests of Zoonotic Pathogen Diversity in Migratory Wildlife

Kristin Koutmou, Chemistry, University of Michigan
Gisselle Medina, National Bio and Agro-Defense Facility, USDA/ARS
Lars Plate, Chemistry and Biological Sciences, Vanderbilt University
Impact of Synonymous Mutation on Translation Speed and Protein Folding During Host Adaptation

Claudia Herrera, Tropical Medicine, Tulane University
Dana Mitzel, National Bio and Agro-Defense Facility, USDA/ARS
Xiaohu Xia, Chemistry, University of Central Florida
A Sensitive Lateral Flow Assay for Point-of-Care Testing of Emerging Zoonotic Diseases

Molecular Basis of Cognition (Year 1)

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.

Lucas Pinto, Neuroscience, Northwestern University *
Evelyn Tang, Physics and Astronomy, Rice University ^
Daniel Burnston, Philosophy / Brain Institute, Tulane University †
Network Topology Underlying Circuit Dynamics During Flexible Cognitive Behavior

Kate Hong, Biological Sciences, Neuroscience Institute, Carnegie Mellon University †
Benjamin Scott, Psychological and Brain Sciences, Boston University †
Matthew Lovett-Barron, Neurobiology, University of California, San Diego †
Understanding Cortical Control Over Subcortical Structures Using an Evolutionary Inspired Engineering Approach
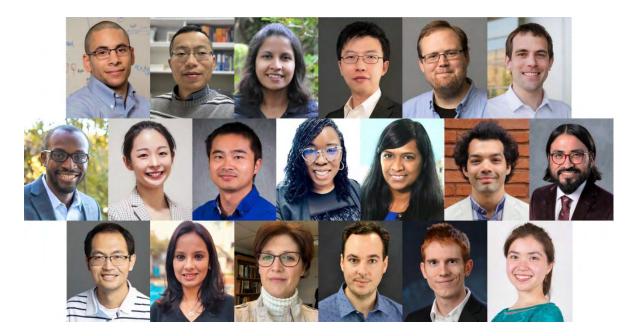
Christina Kim, Center for Neuroscience & Department of Neurology, University of California, Davis ^
Antonio Fernandez-Ruiz, Neurobiology & Behavior, Cornell University †
Bridging Mechanism of Memory Across Levels

Travis Baker, Center for Molecular and Behavioral Neuroscience, Rutgers University †
Megan Peters, Cognitive Sciences, University of California, Irvine ‡
Robert Wilson, Psychology, University of Arizona †
Beyond Computational Behaviorism: The Structure of Thought in Naturalistic Behaviors

Becket Ebitz, Neuroscience, Université de Montréal †
Elizabeth Hong, Biology & Biological Engineering, California Institute of Technology †
Gordon Berman, Biology, Emory University †
FlyRanch: A Platform for Uncovering the Molecular Bases of Hidden Behavioral State Dynamics

Patrese Robinson-Drummer, Psychology, Haverford College †
Allyson Mackey, Psychology, University of Pennsylvania ‡
Sydney Trask, Psychological Sciences, Purdue University †
From Cradle to Grave: Measuring the Lifetime Impact of Early-Life Stress

Negative Emissions Science (Year 3)

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.

Ahmed Badran, Chemistry / Integrative Structural and Computational Biology, Scripps Research Institute *
Jimmy Jiang, Chemistry, University of Cincinnati *
Shaama Mallikarjun Sharada, Chemical Engineering and Materials Science, University of Southern California *
BioDAC: Integrating Enzyme Engineering & Electrochemistry for Sustainable Acrylate Production

Yuanyue Liu, Mechanical Engineering, University of Texas at Austin ^
Phillip Milner, Chemistry and Chemical Biology, Cornell University ^
Marcel Schreier, Chemical and Biological Engineering, University of Wisconsin - Madison ^
Electro-swing Modulation of Lipophilic Environments for Direct Air Capture of Methane

Chibueze Amanchukwu, Pritzker School of Molecular Engineering, University of Chicago *
Yayuan Liu, Chemical and Biomolecular Engineering, Johns Hopkins University *
Houlong Zhuang, Engineering of Matter, Transport & Energy, Arizona State University ^
Surface Charge-induced CO_2 Solvent Regeneration Via Free Volume Manipulation

Kandis Leslie Abdul-Aziz, Chemical and Environmental Engineering, University of California, Riverside *
Mita Dasog, Chemistry, Dalhousie University *
Sunlight Driven CO_2 Capture and Release

Will Bowman, Materials Science and Engineering, University of California, Irvine †
Jose Mendoza, Chemical Engineering and Materials Science, Michigan State University †
Hang Ren, Chemistry, University of Texas at Austin †
Robust Scalable Multifunctional Electrode for CO_2 Reduction and C-C Coupling in Seawater

Anindita Das, Chemistry, Southern Methodist University *
Simona Liguori, Chemical & Biomolecular Engineering, Clarkson University *
Rafael Santos, School of Engineering, University of Guelph *
Triple-intensified Process for Direct Carbon-negative Methanol Synthesis from Biogas

Adam Holewinski, Chemical & Biological Engineering, University of Colorado Boulder ^
Anna Wuttig, Chemistry, University of Chicago ^
A Radical Approach to Negative Methane Emissions

(Summary includes award commitments made in 2022. Due to award terms and timing, totals may not be reflected in audited 2022 financial statements.)

The Year Ahead

RCSA has seven major conferences scheduled for 2023 in Tucson, Arizona.

March 16-19 - Scialog: Signatures of Life in the Universe
April 20-23 - Scialog: Microbiome, Neurobiology and Disease
May 18-21 - Scialog: Advancing BioImaging
July 19-21 - Cottrell Scholar Conference
Sept. 7-10 - Scialog: Mitigating Zoonotic Threats
Oct. 12-15 - Scialog: Molecular Basis of Cognition
Nov. 15-18 - Scialog: Negative Emissions Science

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.

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

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Senior Program Director Richard Wiener - rwiener@rescorp.org
Senior Program Director Andrew Feig - afeig@rescorp.org
RCSA President & CEO Dan Linzer - dlinzer@rescorp.org

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'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. View the changing demographics of our programs on our website's DEI page.