

Flexible Response

Supporting Science through the Pandemic

2022 Annual Report

Letter from the President

One of the significant advantages that foundations have in supporting science is flexibility to move funds to address sudden and unexpected needs. Spring 2020, with the onset of the pandemic, highlighted this point. At RCSA, we heard from many of the physical scientists we support about new challenges they were facing: faculty had to redevelop courses to teach and evaluate students online; universities closed most faculty searches, and postdoctoral fellows who were expected to move into independent positions had nowhere to go; laboratories, except those working directly on COVID-19, were closed; at many institutions, even once laboratories partially reopened, undergraduates were unable to participate in research; with fewer or no researchers on campus, the business model to sustain shared instrumentation facilities with user fees broke down: and those scientists in fields outside of the biomedical sciences, but with potentially novel approaches to viral detection or to modeling and limiting the spread of infection, were typically excluded from pandemic research conversations.

In response to these issues, RCSA quickly launched initiatives to help. We switched the theme of the annual Cottrell Scholar Conference in summer 2020 to online education, and we created a virtual forum to share best practices and to discuss challenges. For 2020-21 and 2021-22, we offered fellowships to senior postdocs working in the research groups of Cottrell Scholars, and we were able to augment our support

with grants from the National Science Foundation. Over the past two years, we provided postbaccalaureate fellowships to undergraduates working with Cottrell Scholars, undergraduates whose research opportunities disappeared or were severely limited during the pandemic; a key consideration for these awards was how each post-baccalaureate fellow would be able to help the Cottrell Scholar after the pandemic rebuild a highly active research program, in part by supervising a new cohort of undergraduate lab members. At primarily undergraduate institutions, many of which experienced significant budget disruptions because of the pandemic, maintaining and replacing scientific instrumentation became a lower priority, so we stepped in to offer support to keep those shared facilities functional. And in 2020, we invited chemists, physicists, and astronomers to several virtual meetings to learn about SARS-CoV2, and to design innovative approaches to analyze, detect, or limit the spread of this virus; RCSA then funded several of the projects that emerged from the discussion.

While we moved forward with these programs, we also had to delay the start of one extremely relevant initiative. In 2019, we developed with the United States Department of Agriculture the plan for a Scialog to bring together early-career scientists from academia and from the USDA to collaborate on promising, out-of-the-box ideas on mitigating zoonotic disease. A few months after finalizing that plan, the rapid spread of a zoonotic disease disrupted our timetable. We did begin that Scialog in 2021, and the enthusiasm and creativity of the Scialog Fellows was no doubt enhanced by the looming and very real public health crisis that has coincided with this three-year sequence of meetings.

With the waning of the pandemic, this annual report provides an opportunity to look back on these initiatives to assess if the redeployment of funds to address what we perceived to be pressing needs was in fact successful. Thus, we take the somewhat unusual step for an annual report of considering initiatives from the past three years, not just 2022. In so doing, we intend to learn from these efforts and to be even better prepared to respond as critically important needs arise again in the future.



Daniel Linzer President & CEO Research Corporation for Science Advancement

Pandemic Initiatives 2020-22

As the COVID-19 pandemic began, RCSA actively listened to the needs and concerns of our community of scientists, and swiftly developed a suite of pandemic responses. Our ability to adapt enabled us to redeploy funds freed up by the cancellation of in-person events, provided crucial financial support to early career scientists facing career disruptions, and kept program participants engaged with their research and with each other. Now, as the world navigates toward a "new normal," RCSA reflects on our approaches, our challenges, and the impact of our response.

COVID-19 Initiative: Detecting and Mitigating Epidemics April 2020

This Scialog-style virtual workshop brought together 109 Cottrell Scholars, past Scialog Fellows, and Scialog Facilitators from the physical sciences to develop research projects on virus detection and characterization that could be used during this or future pandemics. Expedited proposal submission and review enabled RCSA to make awards in less than five weeks. Lessons learned helped refine the model for future virtual convenings.

Awards: 13 awards of \$55,000

Outcomes: The initiative kept faculty active and resulted in at least 27 publications (several high-profile in the scientific literature as well as popular media), three patents, and significant follow-up funding for several teams.

Virtual Cottrell Scholar Convenings 2020 and 2021

RCSA held four virtual meetings during the pandemic to keep the Cottrell Scholar community engaged through dialogue and problem-solving. As before the pandemic, innovative ideas for collaborative projects emerged from these discussions. RCSA funded three Cottrell Scholar Collaborative projects in 2020, and three in 2021.

- A Cottrell Scholar Conversation in May 2020 on the topic of "Reopening Research Laboratories and Programs" was attended by 100 Cottrell Scholars, including established faculty and members of the new class of 2020.
- To respond to the rapid shift from in-person to online courses for the upcoming fall term, the virtual CS Conference in July 2020, "Challenges and Opportunities with Online Education,"



engaged 153 attendees in discussions about virtual lectures and labs, equity, and the assessment of teaching and learning objectives.

- A Cottrell Scholar Conversation on online education in September 2020 was attended by 53 teacher-scholars concerned about a host of challenges with online or hybrid models of education, including student stress and accessibility. They shared tips and tools they found effective.
- The virtual 2021 CS Conference, "Reimagining Higher Education," engaged 154 attendees in discussions designed to help convert lessons of the pandemic into sustainable, positive change in classrooms, labs, and across campuses. Participants shared strategies for fighting inequities in academia and pedagogical practices to continue in a postpandemic world to improve undergraduate and graduate education and the development of postdocs.

Awards: 6 awards of \$25,000

Outcomes: Despite Zoom fatigue and faculty burnout as the pandemic continued, the Cottrell Scholar community remained strong. Open dialogue and sharing of challenges faced by teacherscholars from different institutions and at different points in their careers generated important ideas for RCSA and partner philanthropies, greatly informing RCSA's continued pandemic response.

Cottrell Postdoctoral Fellowships 2020-21 and 2021-22

The sudden closure of faculty searches in response to the pandemic disrupted the plans of many senior postdoctoral fellows who intended to interview for faculty positions in 2020-21 or 2021-22. RCSA offered Cottrell Scholars the opportunity to apply for funding to support an additional postdoctoral year for fellows. Seven of these awards were made possible by two grants from the National Science Foundation, which heard of our effort and encouraged RCSA to expand the initiative. Importantly, awards required that the fellows be provided with significant teaching opportunities to prepare them for a major responsibility as faculty; typically, postdoctoral support focuses entirely on research, and precludes training in pedagogy.

Awards: 27 awards of up to \$75,000 Outcomes: Recipients reported the fellowships provided a much-needed year of additional financial support, teaching opportunities, and research experience that lent a competitive advantage to their later searches for academic positions. All participating postdoctoral fellows stayed in STEM, with 16 securing faculty positions and three finding full-time industrial jobs. Eight are still postdoctoral fellows with plans to interview in fall 2023.

Cottrell Instrumentation Supplements 2020-21

Many Cottrell Scholars at primarily undergraduate institutions rely on shared instrumentation facilities for research, teaching labs, and lecture demonstrations. When colleges experienced a rapid decline in revenue due to campus shutdowns, their support to maintain or upgrade these essential facilities was at risk. RCSA offered Cottrell Scholars partial support for the cost of new or upgraded "priority" instrumentation, with an institutional match required for at least half of the cost.

Awards: 11 awards of up to \$20,000

Outcomes: Recipients reported significant positive impact on both teaching and research as new instrumentation encouraged collaborations and yielded quality data for publications and grants. Recipients used new or modernized instrumentation to establish seven new techniques.

Cottrell Postbaccalaureate Awards 2021-22 and 2022-23

Many Cottrell Scholars conduct research with undergraduates and rely on more senior students to train new members of the group. PUI laboratory closures during the pandemic resulted in a disruption of research programs and a loss of research opportunities for these students. To help their research programs recover, RCSA offered Cottrell Scholars awards to support undergraduate seniors working under their supervision for a year after graduation.

Awards: 16 awards of \$50,000

Outcomes: These awards enhanced the research programs of the Cottrell Scholars and increased the opportunities of postbacs to be admitted to graduate school or secure science jobs. Their research resulted in two published articles and various manuscripts in preparation, and helped recipients renew or secure new grants. At least six 2022 Postbac Fellows were accepted into graduate programs starting in Fall 2023. Implementation challenges RCSA experienced with this award have been used to design a targeted PUI track for Cottrell SEED awards starting in 2024.

Scialog: Mitigating Zoonotic Threats 2021-23

Planning for this Scialog in partnership with the United States Department of Agriculture was well underway before the onset of the pandemic, but it proved to be eerily on point. The first meeting took place virtually after the pandemic began, so participation and research projects have been very much with COVID-19 in mind.

Awards: 42 awards of \$50,000 in direct costs Outcomes: Permitting and other delays led to a slow roll-out of many projects, most of which are still ongoing, but one team has received significant ongoing USDA support based on their preliminary data. Collaboration with a new network of academic scientists has been described as "careertransforming" for USDA researchers.

Lessons Learned

While RCSA is always looking for ways to improve the work of the foundation, the COVID-19 pandemic offered us a chance to experiment with new approaches and learn ways to improve current initiatives. Listening to our stakeholders allowed us to target support in very specific ways that had a strong and lasting impact for grantees, and while the pandemic disrupted RCSA's ability to hold in-person meetings, it presented an opportunity to experiment with virtual meetings, to understand what about face-to-face events is important, and to bring in new practices that make in-person meetings more effective.

2022 Awards

In 2022, Research Corporation for Science Advancement supported early career scientists at colleges and universities in the United States and Canada through two core programs: the Cottrell Scholar Program and Scialog.



The **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 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.

Scialog promotes dialogue and communitybuilding 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.

Cottrell Scholar Program

The Cottrell Scholar Program, started in 1994, champions the very best early career teacher-scholars in chemistry, physics, and astronomy by providing significant discretionary awards for research and by nurturing a community of outstanding leaders in science, education, and academia. Although the Cottrell Scholar Award is the entry point to this interdisciplinary community, the program also supports scholars throughout their academic careers with competitive Cottrell Plus awards. Maintaining an active, multigenerational community of academic scientists is a unique aspect of the Cottrell Scholar program. Cottrell Scholars engage in an annual networking event, providing them an opportunity to share insights and expertise through the Cottrell Scholar Collaborative.

As the pandemic eased, Cottrell Scholars met in person at the 2022 Cottrell Scholar Conference, which focused on the theme "Creativity and Innovation in STEM Education."

66 The Cottrell Scholar network has been the most influential network in my career. **9**- CS 2015 Jen Heemstra

Cottrell Scholar Awards

\$100,000 is awarded to each scholar for a total of \$2,400,000



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



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



Ben Feldman Physics, Stanford University Thermodynamic Characterization of Metalinsulator Transitions in Dual Gated Moiré Superlattices



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



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



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



Ilse Cleeves Astronomy, University of Virginia Identifying Molecular Patterns that Reveal the Chemistry of Planet Formation



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



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



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



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



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



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



Krystle McLaughlin Chemistry, Vassar College Structural Basis for the Conjugative Spread of Antibiotic Resistance



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



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



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



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

66 As they climb the ranks in academia, Cottrell Scholars throw down the ladder and coach you and cheer for you as you make it up as well. It has been transformative for me.

– CS 2018 Lou Charkoudian



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



Aurora Pribram-Jones

Chemistry, University of California, Merced Reframing Interaction in Quantum Mechanical Ensembles and Across Chemistry Learning Communities



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



Ryan Trainor Astronomy, Franklin & Marshall College Feedback in the Circumgalactic Medium Probed with Lymanalpha Emission

Cottrell Scholar Collaborative Awards

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 Scholar Collaborative program, RCSA gave awards of up to \$25,000 each to four projects in 2022 to support efforts to improve undergraduate and graduatelevel science education.



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

This project builds on an existing Cottrell Scholar Collaborative project, Art and the Creative STEM Classroom, which aims to increase awareness of making, an emerging instructional practice where students learn a discipline (and enjoy enhanced creativity and self-expression) 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 College

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, indepth 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 Scholars met face-to-face for the first time since 2019 at the 2022 Cottrell Scholar Conference in Tucson.

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, IMPACT and STAR 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, all SEED awards were for research.

IMPACT Awards of \$5,000 recognize the work of a Cottrell Scholar who has had a national impact in science through their leadership and service activities. **STAR** (excellence in Science Teaching and Research) Awards of \$5,000 recognize the outstanding research and educational accomplishments of Cottrell Scholars and encourage the improvement of science education at American and Canadian universities and colleges.



Cottrell Plus Awardees



SEED Stephen Bradforth Cottrell Scholar 1999 Chemistry, University of Southern California Role of Flanking Bases and Secondary Structure in Thymine Dimer Formation



SEED Ken Mills Cottrell Scholar 2003 Chemistry, College of the Holy Cross Folding Inhibitors of Inteins: A Novel Drug Target



STAR Rae Robertson-Anderson Cottrell Scholar 2010 Physics, University of San Diego



SEED Luis Campos Cottrell Scholar 2015 Chemistry, Columbia University Carbon Dioxide Click Chemistry



SEED Art Winter Cottrell Scholar 2013 Chemistry, Iowa State University Laboratory Photosynthesis of Oligosaccharides: Towards Glycan Chips



STAR

Scott Snyder Cottrell Scholar 2009 Chemistry, University of Chicago



SEED Nancy Makri Cottrell Scholar 1994 Chemistry, University of Illinois at Urbana-Champaign Real-Time Path Integral Studies of Cavity-Controlled Exciton Dynamics



Seth Cohen Cottrell Scholar 2004 Chemistry, 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

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 cuttingedge multidisciplinary themes and propose high-risk collaborative projects.

 Junior faculty like me really benefit from thinking across scales and chatting with folks that have expertise in different modalities.
 Scialog facilitates those cross-disciplinary discussions
 with ease ... a big part of this is that the participants are so willing to share.

– ABI Awardee Mark Sellmyer

Scialog Collaborative Innovation Awards

\$6,040,250 awarded to early career scientists for research through these six multi-year programs.

Emerging from the pandemic, RCSA convened one virtual and five in-person Scialog conferences in 2022. 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.



Microbiome, Neurobiology and Disease

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.

Funding: Provided by RCSA, the Paul G. Allen Frontiers Group, the Frederick Gardner Cottrell Foundation, and the Walder Foundation.

Advancing Biolmaging

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.

Funding: Provided by RCSA, the Chan Zuckerberg Initiative, the Frederick Gardner Cottrell Foundation, and the Walder Foundation.

Signatures of Life in the Universe

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. **Funding:** Provided by RCSA, the Heising-Simons Foundation, The Kavli Foundation, and NASA.

Mitigating Zoonotic Threats

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

Funding: Provided by RCSA and the U.S. Department of Agriculture.

Molecular Basis of Cognition

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.

Funding: Provided by RCSA, CIFAR, the Frederick Gardner Cottrell Foundation, The Kavli Foundation, and the Walder Foundation.

Negative Emissions Science

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. **Funding:** Provided by RCSA, the Alfred P. Sloan Foundation, and the ClimateWorks Foundation.

Microbiome, Neurobiology and Disease Year 2

Elizabeth Bess¹

Chemistry, University of California, Irvine

Aida Ebrahimi¹

Electrical Engineering and Biomedical Engineering, Pennsylvania State University Electrifying Mechanisms of Intestinal Alpha-synuclein Aggregation in Parkinson's Disease Onset

Annika Barber¹

Molecular Biology and Biochemistry, Rutgers University

David Durgan¹

Anesthesiology, Baylor College of Medicine Diurnal Rhythms in Microbiota-Gut-Brain Signaling Leads to Time-of-Day Dependent Susceptibility to Stroke

Funding provided by:
1 RCSA, the Paul G. Allen Frontiers Group, and the Frederick Gardner Cottrell Foundation
2 Walder Foundation

Linnea Freeman¹

Biology, Furman University **Gianna Hammer**¹ Immunology, University of Utah

Lisa Osborne ¹

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 Osborne¹

Microbiology & Immunology, University of British Columbia

Ukpong Eyo¹

Neuroscience, University of Virginia Understanding the Protective Effect of Helminth Immunotherapy through the Lens of the Gut-Brain Axis

Yanjiao Zhou¹ Medicine, UConn Health Ashley Ross¹ Chemistry, University of Cincinnati Unraveling the Effect and

Mechanism of Enteric Microbiota-Neuron Communication in Aging

lliyan lliev¹

Medicine, Weill Cornell Medicine Faranak Fattahi¹ Biochemistry and Biophysics, University of California, San Francisco Identifying Mycobiome-Derived Enteric Neuromodulators

Elizabeth Bess¹

Chemistry, University of California, Irvine **Stephanie Cologna**² Chemistry, University of Illinois at Chicago Tracking Alpha-synuclein from Enteroendocrine Cells to the Enteric Nervous System









Advancing Biolmaging Year 2

Shiva Abbaszadeh¹

Electrical and Computer Engineering, University of California, Santa Cruz

Heather Whitney¹

Radiology, University of Chicago Real-time AI for Programmable Training Arrays

Yevgenia Kozorovitskiv³ Neurobiology. Northwestern University

Abdoulave Ndao²

Electrical and Computer Engineering, Boston University Making Lenses Smart for Optical Imaging and Beyond

Ioshua Brake¹

Engineering, Harvey Mudd College

Kevin Cash¹

Chemical and **Biological Engineering**, Colorado School of Mines Democratizing Access to Macroscopic Bioimaging

Funding provided by:

- ¹ Chan Zuckerberg Initiative
- ² RCSA and the Frederick Gardner Cottrell Foundation ³ Walder Foundation

Mark Sellmyer¹ Radiology, University of Pennsylvania

Arnab Mukheriee¹ **Chemical Engineering** and Biological Engineering, University of California, Santa Barbara Improving MRI Detection Limits San Diego

Kathryn Keenan²

Applied Physics Division, National Institute of Standards and Technology

Crystal Rogers²

Anatomy, Physiology, and Cell Biology, University of California, Davis

Ulugbek Kamilov²

Computer Science and Engineering, Washington University in St. Louis MRI with Molecular Specificity for a New Realm of Neurodevelopmental Research

Ying Hu²

Chemistry, University of Illinois at Chicago

Seunghyun (Seu) Sim²

Chemistry, University of California, Irvine Live Tissue Clearing of Lymph Nodes through **Programmed Dendritic Cells**

Alexandra Walsh¹

Biomedical Engineering, Texas A&M University, College Station

Johannes Schöneberg¹

Pharmacology and Chemistry & Biochemistry, University of California,

4D Imaging and Tracking to Resolve Organelle Form vs. Function

Arnold Hayer² Biology, McGill University

Rosario Porras-Aguilar² Physics & Optical Sciences, University of North Carolina at Charlotte High-speed 4D Morphodynamic Analysis of Migrating Cells

Luke Mortensen¹

Regenerative Bioscience Center & School of Chemical, Materials and Biomedical Engineering, University of Georgia

Huanyu Cheng¹

Engineering Science and Mechanics, Pennsylvania State University Transforming Imaging Collection in the Brain

Stephen Yi²

Biomedical Engineering & Oncology, University of Texas at Austin

Ruixuan Gao³

Chemistry and Biological Sciences, University of Illinois at Chicago In Situ Protein Sequencing by Multiplexed Real-Time



Whitney



Signatures of Life in the Universe Year 2

Aaron Engelhart²

Genetics, Cell Biology, and Development, University of Minnesota

Fang Liu²

Chemistry, Emory University Computational and Experimental Investigations of Martian Brines as Prebiotic Environments

Nick Cowan¹

Earth & Planetary Sciences and Physics, McGill University

Joseph O'Rourke¹

Earth & Space Exploration, Arizona State University

Leslie Rogers¹

Astronomy & Astrophysics, University of Chicago

Chenguang Sun¹

Geological Sciences, University of Texas at Austin Volatile Reservoirs and the Habitability of M-Earths

Funding provided by:

- ¹ The Heising-Simons Foundation ² RCSA
- ³ The Kavli Foundation
- ⁴ NASA

Katherine de Kleer¹

Geological and Planetary Sciences, Caltech Sarah Hörst¹

Earth and Planetary Science, Johns Hopkins University

Sarah Maurer¹

Chemistry & Biochemistry, Central Connecticut State University Enceladus Plume Chemistry: From Lab to Telescope

Kate Follette¹

Physics and Astronomy, Amherst College

Jeffrey Marlow¹

Biology, Boston University From Exoplanets to Microbes: Using Astronomical Image Processing Techniques to Detect Microbes in Astrobiological Contexts

Paul Bracher²

Chemistry, Saint Louis University

Astronomy,

University of Virginia Brimstone Life: Hypothetical Sulfur Worlds and Their Possible Biosignatures

Eddie Schwieterman³ Earth and Planetary

Sciences, University of California, Riverside

Ziming Yang³

Chemistry, Oakland University Methylated Organometallic Gases as Potential Biosignatures

Zachary Adam²

Geoscience, University of Wisconsin–Madison Fang Liu²

Chemistry,

Emory University Assessing False Positive Biosignatures and Prebiotic Synthesis Generated by Two Candidate Autocatalytic Reaction Sets of Aqueous Sulfur

Laurie Barge⁴

Planetary Sciences, NASA Jet Propulsion Laboratory

Frances Rivera-Hernández¹

Earth and Atmospheric Sciences, Georgia Institute of Technology Mars Sample Return: Connecting Martian Environmental Geochemistry to Returned Samples



Mitigating Zoonotic Threats Year 2

Guillaume Bastille-Rousseau

Cooperative Wildlife Research Lab, Southern Illinois University

Gonzalo Vazquez-Prokopec

Environmental Sciences, **Emory University** Measuring and Modeling Mosauito Flight and Movement Behavior at High Spatiotemporal Resolution

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*

Funding provided by: RCSA and USDA

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

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**

Pilar Fernandez

Paul G. Allen School for Global Animal Health. Washington State University

Silvie Huiiben

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

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















Fernandez



Molecular Basis of Cognition Year 1

Lucas Pinto¹

Neuroscience. Northwestern University Evelvn Tang² Physics and Astronomy, **Rice University**

Daniel Burnston³ Philosophy/Brain Institute,

Tulane University Network Topology Underlying Circuit Dynamics During Flexible Cognitive Behavior

Kate Hong³

Biological Sciences, Neuroscience Institute, Carnegie Mellon University

Benjamin Scott³ Psychological and Brain

Sciences, Boston University Matthew Lovett-Barron³

Neurobiology, University of California, San Diego Understanding Cortical Control over Subcortical Structures Using an **Evolutionary** Inspired **Engineering Approach**

Funding provided by:

- ¹ The Walder Foundation
- ² Kavli Foundation
- ³ RCSA and the Frederick Gardner Cottrell Foundation

⁴ CIFAR – Azrieli Global Scholars

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Center for Neuroscience & Department of Neurology, University of California,

Antonio Fernandez-Ruiz³ Neurobiology & Behavior,

Cornell University Bridging Mechanism of Memory Across Levels

Travis Baker³

Christina Kim²

Davis

Center for Molecular and Behavioral Neuroscience. **Rutgers University Megan Peters**⁴ Cognitive Sciences, University of California, Irvine **Robert Wilson**³

Psychology, University of Arizona Bevond Computational Behaviorism: The Structure of Thought in Naturalistic **Behaviors**

Neuroscience. Université de Montréal Elizabeth Hong³ **Biology & Biological** Engineering, California Institute of Technology

Gordon Berman³ **Biology**, Emory University FlyRanch: A Platform for Uncovering the Molecular Bases of Hidden Behavioral State Dynamics

Patrese Robinson-Drummer³

Psychology, Haverford College

Allyson Mackey⁴

Psychology, University of Pennsylvania

Sydney Trask³

Psychological Sciences, Purdue University From Cradle to Grave: Measuring the Lifetime Impact of Early-Life Stress



Negative Emissions Science Year 3

Yuanyue Liu²

Mechanical Engineering, University of Texas at Austin

Phillip Milner²

Chemistry and Chemical Biology, Cornell University

Marcel Schreier²

Chemical and Biological Engineering, University of Wisconsin-Madison Electro-swing Modulation of Lipophilic Environments for Direct Air Capture of Methane

Chibueze Amanchukwu¹

Pritzker School of Molecular Engineering. University of Chicago

Yayuan Liu¹

Chemical and Biomolecular Engineering, Johns Hopkins University

Houlong Zhuang²

Engineering of Matter, Transport & Energy, Arizona State University Surface Charge-induced CO_2 Solvent Regeneration via Free Volume Manipulation

Funding provided by:

- ¹ Alfred P. Sloan Foundation
- 2 RCSA
- ³ ClimateWorks Foundation

Ahmed Badran¹

Chemistry/Integrative Structural and Computational Biology, Scripps Research Institute

Jimmy Jiang¹

Chemistry, University of Cincinnati Shaama Mallikarjun Sharada¹

Chemical Engineering and Materials Science, University of Southern California

BioDAC: Integrating Enzyme Engineering & Electrochem*istry for Sustainable Acrylate* Production

Will Bowman³

Materials Science and Engineering, University of California, Irvine

lose Mendoza³

Chemical Engineering and Materials Science, Michigan State University

Hang Ren³

Chemistry, University of Texas at Austin Robust Scalable Multifunctional Electrode for CO₂ Reduction and C-C Coupling in Seawater

Kandis Leslie Abdul-Aziz¹

Chemical and Environmen- Chemical & Biological tal Engineering, University of California, Riverside

Mita Dasog¹

Chemistry. Dalhousie University Sunlight Driven CO₂ Capture and Release

Anindita Das¹

Chemistry, Southern Methodist University Simona Liguori¹ Chemical & Biomolecular Engineering,

Clarkson University

Rafael Santos¹ School of Engineering, University of Guelph

Triple-Intensified Process for Direct Carbon-negative Methanol Synthesis from Biogas

Adam Holewinski²

Engineering, University of Colorado Boulder

Anna Wuttig²

Chemistry, University of Chicago A Radical Approach to Negative Methane Emissions









2022 Year in Review

January

Six Cottrell Scholars and two Scialog Fellows were elected 2021 Fellows of the American Association for the Advancement of Science for their important contributions to STEM disciplines: In Chemistry: CS 2009 **Penny Beuning**, Northeastern University; CS 2014 **Mircea Dincă**, Massachusetts Institute of Technology; Scialog CMC Awardee **Davide Donadio**, University of California, Davis; Scialog CMC Fellow **Michael D. Pluth**, University of Oregon; CS 2015 **Stefan Stoll**, University of Washington; CS 2008 **Charles Sykes**, Tufts University; and CS 1994 **Lynmarie K. Thompson**, University of Massachusetts Amherst. In Physics: CS 2013 **Henriette Elvang**, University of Michigan.

The "Spotlight on Scialog: Negative Emissions Science" special issue from *iScience*, a collaboration of Cell Press, RCSA and the Alfred P. Sloan Foundation, continued in 2022 with several articles from Fellows of the initiative. "Predictive Energetic Tuning of C-Nucleophiles for the Electrochemical Capture of Carbon Dioxide" from **Oana Luca**, Chemistry, University of Colorado Boulder, explored work on electrochemically enabled carbon capture. NES Fellows Caleb Hill, Chemistry, University of Wyoming, Jose Mendoza, Chemical Engineering and Materials Science, Michigan State University, Jesús M. Velázquez, Chemistry, University of California, Davis, and Luisa Whittaker-Brooks, Chemistry, University of Utah, also presented a perspective article on bridging the gap between synthesis,

simulations, and analysis of multidimensional catalysts. (Velázquez and Whittaker-Brooks are also Cottrell Scholars.) The issue was curated by and curated by NES Fellow **Marta Hatzell**, Mechanical Engineering, Georgia Institute of Technology.

2014 Cottrell Scholar and 2020 FRED Award recipient **Cindy Regal**, Physics, University of Colorado Boulder, published a paper in *Nature Physics*, "Optomechanics for quantum technologies," reviewing recent progress in quantum state preparation and entanglement of mechanical systems.

February

Cottrell Scholar 2020 **Frank Leibfarth**, Chemistry, University of North Carolina at Chapel Hill, published a new paper in *Science*. In "Diversification of Aliphatic C–H bonds in Small Molecules and Polyolefins through Radical Chain Transfer," he and his colleagues detailed a two-step upcycling sequence to process plastic waste, turning postconsumer polyethylene foam into a potentially valuable ionomer.

Five Scialog Fellows and a Cottrell Scholar were awarded 2022 Sloan Research Fellowships: MND Fellow **Pamela Chang**, Microbiology and Immunology, Cornell University; NES Fellow **Chong Liu**, Chemistry and Biochemistry, University of California, Los Angeles; MND Fellow **Ashley Ross**, Chemistry, University of Cincinnati; Advanced Energy Storage

Fellow Justin Sambur, Chemistry, Colorado State University; ABI and CMC Fellow Lu Wei, Chemistry and Chemical Engineering, California Institute of Technology; and Cottrell Scholar 2022 Wen-fai Fong, Astronomy, Northwestern University.

The American Chemical Society released a podcast featuring a conversation between Cottrell Scholar 2012 and 2019 FRED Award winner Sarah Reisman. Chemistry, California Institute of Technology, and CS 2006 Melanie Sanford, Chemistry, University of Michigan. They talked about how organic chemistry is changing and how they've learned to choose priorities.

Cottrell Scholar 2019 and Scialog: Time Domain Astrophysics Fellow Emily Rauscher, Astronomy, University of Michigan, was named a 2022 Simons Fellow in theoretical physics.

March

Barely a year after their Scialog: NES collaborative award, the team of **Greeshma Gadikota**. Civil and Environmental Engineering, Cornell University, and Venkat Viswanathan, Mechanical Engineering, Carnegie Mellon University, spawned a startup company called CHEMent to commercialize zerocarbon cement production powered by renewable electricity and won an ARPA-E grant to further their research to integrate CO₂ capture with recycling technology. Later in the year, Gadikota's new startup company at Cornell University, Carbon To Stone, was awarded a \$500,000 pre-purchase agreement to use captured CO_2 to produce carbonates for use in alternative cements.

Cottrell Scholar 2019 Alison Narayan, Chemistry, University of Michigan, published a new paper in *Nature*. Featured on the cover, "Biocatalytic Oxidative Cross-Coupling Reactions for Biaryl Bond Formation" detailed the design and engineering



Greeshma Gadikota

of enzyme biocatalysts that help to connect the necessary building blocks through their carbonhydrogen bonds.

How do you design an effective, engaging and equitable remote event? In the "What Does a Community Need?" study for the Alfred P. Sloan Foundation, CoRD lab and Simply Secure interviewed attendees of multiple virtual conferences to find out. Scialog, which held seven virtual conferences in 2020 and 2021, was noted for its successful communications and structures for facilitated breakouts.

Cottrell Scholar 2014 Tyrel McQueen, Chemistry, Johns Hopkins University, was one of three keynote speakers at the Opening Session of the Spring American Chemical Society National Meeting, "Bonding Through Chemistry." McQueen's talk, "Quantum Materials," highlighted recent discoveries that have implications for sustainable energy, information technology and more.

The American Chemical Society awarded its highest honor, the Priestley Medal, to Peter Dervan, California Institute of Technology. In 1974, in the early days of supramolecular chemistry, RCSA supported Dervan (then an assistant professor) with funding to study "Organometallic anionic rearrangements." His pioneering work treating DNA as an organic molecule helped lay the foundation for chemical biology.

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Yan Yao

Timothy Atherton

Yan Yao, Electrical and Computer Engineering, University of Houston, received an ARPA-E *OPEN 2021* award for research to develop a high-energy, fastcharging, lithium- and transition metal-free battery. The project grew from a 2017 Scialog: AES collaborative award to Yao, **Puja Goyal**, Chemistry, Binghamton University, and **Jahan Dawlaty**, Chemistry, University of Southern California, to investigate the structureproperty relationship of quinone crystals.

CS 2015 **Timothy Atherton**, Physics, Tufts University, was a corresponding author of a paper in *Physical Review Physics Education Research*. "LGBT+ physicists: Harassment, Persistence, and Uneven Support" focused on the experiences and challenges faced by groups within the LGBT+ community. The paper was featured in *Physics*. Atherton was also quoted in a *Physics Today* article on the challenges in retaining LGBT+ physicists and efforts needed to create more actively inclusive classrooms and research spaces.

April

Scialog: Microbiome, Neurobiology and Disease, sponsored by RCSA, the Paul G. Allen Frontiers Group and the Frederick Gardner Cottrell Foundation, with support from the Walder Foundation, convened virtually for its second meeting. **Rosa Krajmalnik-Brown** from the ASU Biodesign Institute delivered the keynote address, "Can Changing Gut Bacterial Community Improve Gastrointestinal and Autism Symptoms?"

"Women Are Creating a New Culture for Astronomy," a *Scientific American* article about a new generation of women scientists challenging the status quo, featured six members of the RCSA community: Cottrell Scholar 2019 **Caitlin Casey**, University of Texas at Austin; CS 2017 **Laura Chomiuk**, Michigan State University; CS 2019 **Emily Levesque** and CS 2020 **Jessica Werk**, University of Washington; Scialog: TDA Fellow **Kathryne Daniel**, Bryn Mawr College; and Scialog: SLU Fellow **Sarah Hörst**, Johns Hopkins University. (Chomiuk and Levesque are also Scialog: TDA Fellows.)

1996 Cottrell Scholar and 2021 SEED Award recipient **Ziqiang Wang**, Physics, Boston College, was a corresponding author of a paper in the journal *Nature Physics*. In "External Magnetic Field Causes Shift in Electronic Dirac Band Structure in a Kagome Magnet," measurements by the team of U.S. and Chinese researchers confirmed predictions about the quantum behavior of kagome magnets. The paper is an outcome of Wang's SEED Award project. In a *Science* article, "New Goals for Science Philanthropy," Science Philanthropy Alliance president **France Cordova** called attention to RCSA and other Alliance members that are catalyzing more equitable science funding and bringing fresh approaches to grantmaking.

Cottrell Scholar 2019 **Emily Levesque**, Astronomy, University of Washington, and Scialog: Solar Energy Conversion Fellow **So Hirata**, Chemistry, University of Illinois, Urbana-Champaign, were awarded 2022 Guggenheim Foundation Fellowships.

A Cottrell Scholars Collaborative project is expanding connections between Cottrell Scholars and FLAMENet, a national network of science faculty, psychologists and education researchers working to promote resilience and tenacity among collegelevel STEM students. In the spring of 2022, the collaboration presented three mini-workshops on "Inclusivity in Introductory STEM Courses" sponsored by FLAMEnet (Factors affecting Learning, Attitudes, and Mindsets in Education network) and RCSA.

Scialog: SLU Fellow **Betül Kaçar**, Astrobiology, University of Wisconsin, Madison, studies the origin of life on Earth to understand the potential for life on other worlds. In a TED talk, she explored how a deeper understanding of chemical processes that allowed life to emerge on our planet might enable us to spark life on other planets.



Seppe Kuehn

Madhav Mani

Cottrell Scholar 2008 **Tehshik Yoon**, Chemistry, University of Wisconsin – Madison, was guest editor of a special "Trailblazers" issue of *Chemical* & *Engineering News* celebrating the work and contributions of LGBTQ+ chemists. Yoon and CS 2020 **Song Lin**, Cornell University, were among the out, proud, and successful LGBTQ+ chemists profiled.

Cottrell Scholar 2020 **Elisabetta Matsumoto**, Physics, was featured in a "Profiles in Versatility" article in the April edition of *APS News*. The profile discussed Matsumoto's work on the mathematics and physics of knitting, creativity in science, and how she weaves her many interests together into a rich intellectual fabric.

Seppe Kuehn, Physics, University of Illinois at Urbana-Champaign, and **Madhav Mani**, Engineering Sciences and Applied Mathematics, Northwestern University, didn't write a Scialog proposal together, but the conversation they began as Fellows at Scialog: Molecules Come to Life in 2016 led to a paper in *Cell* titled "Genomic Structure Predicts Metabolite Dynamics in Microbial Communities." Highlighted in a perspective article, their research could offer new insights into global climate.

May

Scialog: Advancing BioImaging, sponsored by RCSA, the Chan Zuckerberg Initiative, and the Frederick Gardner Cottrell Foundation, with additional support from Walder Foundation, held its second meeting (its first in person) in Tucson. Keynote speakers **Brian Pogue**, University of Wisconsin-Madison, and CS 2014 **Jenn Prescher**, University of California, Irvine, set the stage for discussion with talks about their research, current tools and breakthroughs needed to accelerate development of the next generation of imaging technologies.

Six Cottrell Scholars and Scialog Fellows were honored as 2022 Camille Dreyfus Teacher-Scholars: CS 2021 **Justin Caram**, Chemistry, University of California, Los Angeles; CS 2021 **Christopher Hendon**, Chemistry, University of Oregon; CS 2020 & NES Fellow **Jesús Velázquez**, Chemistry, University of California, Davis; CMC Fellow **Jefferson Chan**, Chemistry, University of Illinois at Urbana-Champaign; CMC Fellow **Brian Liau**, Chemistry and Chemical Biology, Harvard University; and AES Fellow **V. Sara Thoi**, Chemistry, Johns Hopkins University. Cottrell Scholar 2018 and Scialog: CMC Fellow Lou Charkoudian, Chemistry, Haverford College, was selected as the first recipient of the Council on Undergraduate Research's Silvia Ronco Innovative Mentor Award. The award, established in February 2022 by a gift from RCSA in honor of CUR's past president and current RCSA Senior Program Director Silvia Ronco, recognizes a tenuretrack faculty member within 10 years of their first faculty appointment who demonstrates success in chemical sciences and whose mentoring practices have supported undergraduate research.

Four RCSA awardees spoke at RCSA's May Board of Directors meeting in New York City. Cottrell Scholar 2015 Luis Campos, Chemistry, Columbia University; Scialog TDA Fellow Jackie Faherty, American Museum of Natural History; Scialog TDA Fellow Melissa Ness, Astronomy, Columbia University; and CS 2020 Glen O'Neil, Chemistry,



Silvia Ronco, Lou Charkoudian, and Dan Linzer

Montclair State University, shared their experiences and perspectives on how RCSA can work to make its programs more inclusive.

June

The second meeting of Scialog: Signatures of Life in the Universe, co-sponsored by RCSA and the Heising-Simons Foundation, with additional support from The Kavli Foundation, convened in Tucson to catalyze fundamental science in the search for life beyond Earth. Keynote speakers **Tori Hoehler** and **Niki Parenteau**, NASA Ames, and **Victoria Meadows**, University of Washington, set the stage for discussions with talks on the key areas of research that are needed to inform mission design in the search for life beyond Earth.

The German-American Fulbright Commission awarded its 2022 Fulbright-Cottrell Award for excellence in research and teaching to **Diego Andrada**, a chemist at Saarland University in Germany. The award is based on RCSA's Cottrell Scholar Award. Awardees become eligible to participate in Cottrell Scholar meetings and conferences, and to take part in Cottrell Scholar Collaborative projects.

Scialog: Mitigating Zoonotic Threats Fellow Salvador Almagro-Moreno, a microbiologist at the University of Central Florida's Burnett School of Biomedical Sciences, was among 10 researchers to



2022 Fulbright-Cottrell Scholar Diego Andrada

receive the Burroughs Wellcome Fund Investigators in the Pathogenesis of Infectious Disease (PATH) award. Almagro-Moreno's research focuses on emerging strains of flesh-eating bacteria.

Cottrell Scholar 1996 and RCSA Board Member **Catherine J. Murphy**, the Larry Faulkner Endowed Chair in Chemistry and Head, Chemistry Department, University of Illinois, Urbana-Champaign, won the Royal Society of Chemistry's 2022 Centenary Prize for "pioneering work on the growth, size and shape control, biological applications and environmental implications of gold nanocrystals, and for excellence in communication."

Cottrell Scholar 2010 **Duncan Brown** was named Syracuse University's vice president for research. He is a member of the Cottrell Scholar Selection Committee and is a Scialog: TDA Fellow. Four RCSA-supported scientists were among 31 recipients of the 2022 Blavatnik National Awards for Young Scientists, which honor early career scientists and engineers: Scialog MND Awardee **Elaine Hsiao**, Integrative Biology and Physiology, University of California, Los Angeles; Cottrell Scholar 2013 and Scialog SEC Awardee **Gordana Dukovic**, Chemistry, University of Colorado, Boulder; and Scialog TDA Fellow **Mansi M. Kasliwal**, Astronomy, California Institute of Technology; and TDA Awardee **Raffaella Margutti**, Physics & Astronomy, University of California, Berkeley.

Inside Philanthropy called RCSA "philanthropy's steadiest supporter of basic scientific research" in a feature article on the foundation's work and goals. The article gave details about RCSA's Cottrell Scholar and Scialog programs and explained how the foundation has made a difference to many researchers at a point in their careers when a little bit of support and recognition meant a lot.

"Thermodynamics of Wettability: A Physical Chemistry Laboratory Experiment," a paper in the Journal of Chemical Education by Cottrell Scholar 2010 **Sarbajit Banerjee** and **Rachel Davidson**, Chemistry, Texas A&M University, was an outcome of the Cottrell Fellowship they received in 2020. Cottrell Fellowships supported the work of postdocs whose plans to start independent academic or research careers were delayed or derailed by pandemicrelated hiring freezes.

July

More than 100 Cottrell Scholars met face to face to welcome a new class of teacher-scholars at the 28th Annual Cottrell Scholar Conference in Tucson. Centered around the theme of "Creativity and Innovation in STEM Education," the conference was the community's first in-person meeting since 2019. The conference was a platform for discussions on incorporating creativity and innovation into STEM education, and an opportunity to develop ideas for educational collaborations. The importance of inclusive teaching approaches and more equitable academic environments – to prevent loss in the STEM pipeline and build scientific identity for students – ran throughout the talks, workshops, presentations and discussions at the conference.

RCSA launched a new award to recognize and welcome outstanding senior scientists with diverse perspectives and backgrounds into the Cottrell Scholar community: the Robert Holland Jr. Award



Robert Holland Jr.

Maura McLaughlin

for Research Excellence and Contributions to Diversity, Equity, and Inclusion. The award honors the legacy of the late **Robert Holland Jr.**, an engineer and corporate executive who served as a member of RCSA's Board of Directors from 1997-2010. Cottrell Scholars helped design the award as a way to honor and learn from new colleagues with backgrounds and contributions currently underrepresented in their community. Award recipients will become full members of the Cottrell Scholar community, able to attend annual conferences and eligible to participate in Cottrell Scholar Collaborative projects.

Cottrell Scholar 2022 **Scott Cushing**, Chemistry, California Institute of Technology, won The Kavli Foundation's inaugural Shirley M. Malcolm Prize for Excellence in Mentoring. The award celebrates the important role mentors serve during the education, training, and advancement of promising students and scientists.

Cottrell Scholars who authored Teach Better, Save Time, and Have More Fun: A Guide to Teaching and Mentoring in Science in 2014 to help early career faculty become effective educators without "reinventing the wheel" published an expanded second edition with a particular focus on effective online and hybrid teaching, student and faculty mentoring, graduate student support, and inclusive teaching and mentoring. The new edition is authored by Cottrell Scholar 2009 **Penny J. Beuning**, Chemistry, Northeastern University; CS 1996 **Dave Z. Besson**, Physics, University of Kansas; CS 2009 **Scott A. Snyder**, Chemistry, University of Chicago: and CS 2003 **Nicola L.B. Pohl**, Chemistry Indiana University Bloomington.

Cottrell Scholar 2009 **Maura McLaughlin**, Physics, West Virginia University, received the Southeastern Universities Research Association's Distinguished Scientist Award. McLaughlin studies neutron stars and their environments through radio, X-ray, and gamma-ray observations, and helps lead a project that involves high school students across the U.S. in pulsar-related research.

Chemical & Engineering News named two 2021 Cottrell Scholars among their 2022 Talented 12 for using chemistry to make the world a better place: **Alexis C. Komor**, Chemistry, University of California, San Diego (also a Scialog: CMC awardee) and **Alexandra Velian**, Chemistry, University of Washington.

Three Scialog Fellows received 2022 Beckman Young Investigator Awards: MND Awardee **Mark Mimee**, Microbiology/Pritzker School of Molecular Engineering, University of Chicago; ABI Awardee Lisa Poulikakos, Mechanical and Aerospace Engineering, University of California, San Diego; and NES Fellow **Marcel Schreier**, Chemical and Biological Engineering, University of Wisconsin, Madison. These awards are given to foster the invention of methods, instruments, and materials that will open new avenues of research in science.

August

Cottrell Scholars 2012 **Will Dichtel**, Northwestern University, and 2019 **Ellen Matson**, University of Rochester, gave keynote talks at the American Chemical Society National Meeting in Chicago. Dichtel, who won RCSA's FRED Award in 2018, spoke at the opening session titled "Sustainability in a Changing Word." Matson, who is also a Fellow of two Scialog initiatives, AES and NES, gave The Kavli Foundation Emerging Leader in Chemistry Lecture. CS 2010 **Nicole Snyder**, Davidson College, was also elected a 2022 American Chemical Society Fellow for her contributions to science and was recognized at the meeting.

Cottrell Scholar 2022 **Scott Cushing**, Chemistry, California Institute of Technology, received a \$1.1 million grant from the W.M. Keck Foundation to build a new type of all-electron instrument for measuring processes that happen on a femtosecond timescale.

Two Scialog: SLU Fellows – **lise Cleeves**, Astronomy, University of Virginia (also a 2022 Cottrell Scholar) and **Ke Zhang**, Astronomy, University of Wisconsin-Madison – were among the co-authors of a paper in *The Astrophysical Journal* Letters presenting evidence of what is perhaps the galaxy's youngest planet.

Two Scialog: CMC Fellows were selected by the editors of *ACS Infectious Diseases* and the ACS Division of Biological Chemistry as winners of the 2022 ACS Infectious Diseases Young Investigator Awards:

Tania Lupoli, Chemistry, New York University, and **Laura Sanchez**, Chemistry and Biochemistry, University of California, Santa Cruz.

A 2020 Cottrell Scholar Collaborative project to cultivate the STEM pipeline is an integral part of the Center for Interfacial Ionics, selected by the National Science Foundation to receive a Phase I Center for Chemical Excellence award. CS 2014 Shannon Boettcher, Chemistry, University of Oregon, is PI for the center, which seeks to revolutionize the understanding of interfacial-ion-transfer kinetics. The center's broader agenda of integrating diverse educational institutions into its research strategy incorporates the STEM pipeline model developed with CS 2015 Tom Markland, chemistry Stanford University, CS 2017 Yogi Surendranath, chemistry, Massachusetts Institution of Technology, and collaborators **Yixian Wang**, California State University, Los Angeles, Matt Minus, Prairie View A&M University, and Niva Sa, University of Massachusetts, Boston.

In an article published in *Science*, research led by Cottrell Scholar 2012 **William Dichtel** and **Brittany Trang**, Chemistry, Northwestern University, detailed a cheap new method that shows promise in breaking down some "forever chemicals" that contaminate soils and drinking water worldwide. The research in "Low-Temperature Mineralization of Perfluorocarboxylic Acids" was also featured in the *New York Times*. Cottrell Scholars 2018 **Lou Charkoudian**, Chemistry, Haverford College, and 2015 **Jen Heemstra**, Chemistry, Emory University, teamed up with education researcher **Lisa Corwin** to publish a new, open-access book from the Council on Undergraduate Research (CUR) on helping students learn from failure: *Confronting Failure: Approaches to Building Confidence and Resilience in Undergraduate Researchers.*

September

The 2nd meeting of Scialog: Mitigating Zoonotic Threats, sponsored by RCSA and the U.S. Department of Agriculture, with support from Walder Foundation, was held in Tucson. Keynote speaker **Amy Vincent**, USDA Agricultural Research Service, spoke on Influenza A in pigs and humans, and its implications for public health and pandemic planning, and **Michael Wimberly**, University of Oklahoma, gave a talk on human-caused climate change and its effects on infectious disease transmission.

Three RCSA-supported scientists are lead investigators of energy frontier research centers funded by the U.S. Department of Energy: Scialog AES & NES Fellow Jenny Yang, Chemistry, of the Center for Closing the Carbon Cycle, and Cottrell Scholar 2017 Shane Ardo, Chemistry, of the Ensembles of Photosynthetic Nanoreactors center, both at the University of California, Irvine; and CS 1999 Dimitri Basov, Physics, of the Programmable Quantum Materials center at Columbia University.



Astronomical research team at the University of Hawai'i

Eight students from Hawai'i participated in the first two years of a summer astronomical research program for undergraduates that began with a Scialog: Time Domain Astrophysics collaborative award. Scialog Fellows Sukanya Chakrabarti, Physics and Astronomy, University of Alabama in Huntsville, Daniel Huber, Astronomy, University of Hawai'i, and Robyn Sanderson, Physics and Astronomy, University of Pennsylvania, received a team award in 2019 for their collaborative proposal, "Beyond Gaia: Expanding the Dynamical Map of the Milky Way with Asteroseismic Distances." The proof-of-concept study arising from their initial groundwork led to a large collaborative Astronomy and Astrophysics Research Grant from the National Science Foundation to apply their method to a much larger sample, mapping distances across the galaxy, and to involve local undergraduates in an astronomical research program.

Five members of the RCSA community were named winners of American Chemical Society 2023 national awards: Scialog: CMC Fellow Julia A. Kalow, Northwestern University, won the ACS Award in Pure Institute for Advanced Research (CIFAR), with Chemistry. Scialog NES Awardee Robert J. Gilliard Jr., University of Virginia, won the Harry Gray Award for Creative Work in Inorganic Chemistry by a Young Investigator. Cottrell Scholar 1994 Nancy Makri, University of Illinois Urbana-Champaign, won the ACS Award in Theoretical Chemistry. CS 2014 Jennifer A. Prescher, University of California, Irvine, and CS 1996 Vincent M. Rotello, University of Massachusetts, won Arthur C. Cope Scholar Awards. Maria Gomez, professor of chemistry at Mount Holyoke College, received the 2023 ACS Award for Research at an Undergraduate Institution, sponsored by RCSA.

Cottrell Scholar 2012 and 2017 Cottrell FRED Award recipient Sara Skrabalak, Chemistry, Indiana University Bloomington, is leading a new National Science Foundation-supported research center focused on transforming nanocrystal discovery and design. The multi-institution research team also includes CS 2009 Lane Baker, Chemistry, Texas A&M University.

October

The inaugural meeting of Scialog: Molecular Basis of Cognition, co-sponsored by RCSA, the Frederick Gardner Cottrell Foundation and the Canadian additional support from The Kavli Foundation and Walder Foundation, was held in Tucson. The initiative, which seeks to advance understanding of the molecular processes that underlie memory and cognition, began with keynote talks by Marina Picciotto, Yale, and Adam Cohen, Harvard.

Two RCSA-supported scientists were awarded the 2022 Nobel Prize in Chemistry. Carolyn R. Bertozzi, Morten Meldal and K. Barry Sharpless share the award "for the development of click chemistry and bioorthogonal chemistry." Bertozzi received an RCSA Research in Innovation Award in 1997 to develop new strategies for anti-tumor therapy and diagnosis. Sharpless, who is being awarded his second Nobel Prize in Chemistry, received an RCSA grant in 1971 to study the chemistry of cis-dioxotransition metal species and its relevance to the action of mixed function oxygenases.

Well-designed interactions can help scientists form the collaborations that have become increasingly important in today's research environment, according to a study based on data from four series of Scialog conferences. The paper, "Dynamics of Social Interaction: Modeling the Genesis of Scientific Collaboration, was published in *Physical Review*



Emma Zajdela

Daniel Abrams **Richard Wiener**

Research. Northwestern University Ph.D. candidate **Emma Zajdela** was first author, and she and her adviser **Daniel Abrams** were corresponding authors. Co-authors were RCSA's Senior Program Directors Richard Wiener and Andrew Feig, RCSA Data Analytics Specialist Kimberly Huynh, and Northwestern undergraduate Andy Wen. The paper analyzed data from four Scialog series – 12 conferences over the pre-COVID period from 2015 to 2019, highlighting the importance of small-group interactions in catalyzing collaborations. Further study could shed more light on the impact of conference design.

Three Scialog Fellows were 2022 recipients of the National Institutes of Health Director's New Innovator Award: ABI awardee Johannes Schöneberg, Pharmacology and Chemistry & Biochemistry, University of California, San Diego; ABI Fellow David Van Valen, Biology and Bioengineering,



Andrew Feig Kimberly Huvnh

California Institute of Technology; and CMC awardee Wenjing Wang, Chemistry and Life Sciences Institute, University of Michigan, Ann Arbor.

The American Physical Society's 2023 Prize for a Faculty Member for Research in an Undergraduate Institution, sponsored by RCSA, was awarded to Cottrell Scholar 2010 Rae Robertson-Anderson. University of San Diego, "for outstanding contributions and innovative approaches to fundamental understanding of biopolymer composite dynamics and highly impactful research opportunities and physics training to a diverse set of undergraduate students." She is a 2022 RCSA STAR Award recipient, a Scialog: MCL Fellow, and was 2022 chair of the Cottrell Scholar Program Committee.

Three RCSA awardees from University of Arizona shared the impact of RCSA support on their work at the October RCSA Board of Directors meeting

in Tucson: Scialog CMC Fellow Judith Su, Optical Sciences and Biomedical Engineering; Cottrell Scholar 2018 Eduardo Rozo, Physics; and CS 2021 Thomas Gianetti, Chemistry.

The American Physical Society's Fellows for 2022 included nine members of the RCSA community: Cottrell Scholar 2002 Jonathan R. Friedman, Amherst College; CS 2014 Carla Fröhlich, North Carolina State University; Scialog MCL Fellow **Thomas Gregor**, Princeton University; CS 2003 Michael Hildreth, University of Notre Dame; CS 2020 Huey-Wen Lin, Michigan State University; Scialog SLU Fellow Smadar Naoz, University of California, Los Angeles; CS 2010 and Scialog MCL Fellow Rae Robertson-Anderson, University of San Diego; CS 2003 and Scialog SEC Fellow Richard Taylor, University of Oregon; and CS 2016 Di Xiao, University of Washington. Cottrell Scholar 1998 Vivek Sharma, University of Illinois



Judith Su, Eduardo Rozo, and Thomas Gianetti

Chicago, was named recipient of the 2023 John H. Dillon Medal "for fundamental advances toward a molecular-level understanding of non-equilibrium polymer dynamics and for developing methods to accurately measure extensional deformation of polymeric materials and interfacial flows."

Scialog: Negative Emissions Science Awardee Simona Liguori, Clarkson University, received funding from the U.S. Department of Energy in October 2022 for a project to develop a potentially transformational approach to produce lowcost, carbon-neutral hydrogen from biomass gasification using hydrogen-selective membraneassisted water-gas shift reactors. The idea was conceived outside of Scialog with another NES Awardee, Andrea Hicks, University of Wisconsin-Madison, who will conduct life-cycle assessment and environmental analysis.





Simona Liguori

Sean Decatur

November

The third meeting of Scialog: Negative Emissions Science, sponsored by RCSA and the Alfred P. Sloan Foundation, with additional support from Climate Pathfinders Foundation and ClimateWorks Foundation, convened in Tucson. Keynote speaker Jeffrey Long, University of California, Berkeley, discussed some of the critical research needs for extracting CO_2 from air at scale.

Two 2019 Cottrell Scholars – Dennis Cao, Chemistry, Macalester College, and Paul Raston, Chemistry, James Madison University-were named Henry Dreyfus Teacher-Scholars for 2022. The award honors young faculty in the chemical sciences for their scholarship and commitment to undergraduate education.

RCSA President Daniel Linzer was quoted in a Physics Today article on the important role of private philanthropy in funding basic research in the physical sciences. The article also featured quotes from RCSA board member Lars Bildsten, partners from the Science Philanthropy Alliance, the Heising-Simons Foundation, the Gordon and Betty Moore Foundation and the Alfred P. Sloan Foundation. as well as a photo of Cottrell Scholar 2018 Abigail Vieregg, Kavli Institute for Cosmological Physics.

Astronomy's November issue highlighted "Rising Stars in Astronomy," including CS 2022 and TDA Fellow Wen-Fai Fong, Astronomy, Northwestern University, CS 2023 Chanda Prescod-Weinstein, Physics, University such as agricultural waste and plastic trash into of New Hampshire, and TDA Fellow Jedidah Isler, Physics and Astronomy, Dartmouth College.

December

Cottrell Scholar 2019 Kerstin Perez, Physics, Massachusetts Institute of Technology, published her second op-ed on inclusive teaching in Inside Higher Ed, suggesting ways for minoritized instructors to balance support for students with their own personal and professional success. Perez was among 25 scientists RCSA supported in attending The OpEd Project's training program and is a member of a Cottrell Scholar Collaborative working to promote resilience and tenacity among collegelevel STEM students.

Scialog: Molecules Come to Life awardee Margaret Gardel, Physics, University of Chicago, was selected as the inaugural lead editor of PRX Life, a new APS Physical Review journal. The fully open access journal will publish research articles, perspectives, reviews and tutorials by and for scientists working at the interface of physics and biology.

Cottrell Scholar 1996 and RCSA Board Director **Sean Decatur** was named the new president of the American Museum of Natural History. He is a chemist and had been president of Kenyon College since 2013.

Scialog: NES Fellow Kandis Leslie Abdul-Aziz, Chemical and Environmental Engineering, University of California, Riverside, was named to the Popular Science Brilliant 10 for 2022. Her research explores converting refuse products useful materials.

Scialog: Advanced Energy Storage Fellow James McKone, Chemical & Petroleum Engineering, University of Pittsburgh, is helping lead a multi-site project to enable the design of new technologies for an environmentally sustainable chemical industry. Demonstrating the long-term value of the multidisciplinary networks forged at Scialogs, the project includes two other Fellows from AES, which concluded in 2019: Veronica Augustyn, Materials Science & Engineering, North Carolina State University, and Cottrell Scholar 2019 Ellen Matson, Chemistry, University of Rochester. Scialog: NES Fellow **Houlong Zhuang** is one of seven winners of *Materials Today*'s 2022 Rising Star Awards. Zhuang is an assistant professor in the School for Engineering of Matter, Transport and Energy at Arizona State University.

Inside Philanthropy's year-end awards recognized Scialog: Signatures of Life in the Universe as its "Science-Fiction-Worthy Cause of the Year" for 2022, highlighting a November article quoting RCSA Senior Program Director **Richard Wiener** on private and philanthropic support for the search for life beyond Earth.

In Memoriam: Brian Andreen, Former RCSA Vice President

RCSA mourns the loss of Brian Andreen, who died in Tucson on January 19, 2023. Although Andreen ended his decades-long career with the foundation in 1996 as vice president, he is remembered today as much for his warmth and easygoing manner as for his dedication to nurturing early career physical scientists, especially at undergraduate institutions.

"Brian Andreen helped create a culture of community building at RCSA that went beyond just giving out awards," RCSA President & CEO Daniel Linzer said. "That culture continues today."

"Brian understood the power of building scientific community," said RCSA Senior Program Director Silvia Ronco. "At RCSA, Brian started programs like Cottrell Scholars and Partners in Science aimed at improving science teaching by embedding research activities at the college and high school levels. His tireless work with science faculty at primarily undergraduate institutions prompted the start of the **Council on Undergraduate Research** in 1978 as a way to advocate successfully for new programs from federal funding agencies."

"His passion in promoting community building to impact change went beyond starting a national organization," said Ronco, who also served as CUR's 2020-2021 president. "Brian's endless sense of humor and wise advice is still remembered by many in the communities he touched." Andreen was born in Superior, Wisconsin, and received his undergraduate degree from the University of Wisconsin at Superior and a master's degree in analytical chemistry from Florida State University. He was supervisor of chemical research at the Institute of Gas Technology in Chicago before joining Research Corporation in 1964. He was editor of three editions of *Research in Chemistry* and the first edition of *Research in Physics and Astronomy*. He was a Fellow of the American Association for the Advancement of Science (AAAS), and a member of the American Chemical Society (ACS) and the Midwest Association of Chemistry Teachers in Liberal Arts Colleges (MACTLAC).

Andreen joined Research Corporation in 1964 as regional director, serving the Chicago office from 1964-1969, the Minneapolis office from 1969-1983, and the Tucson headquarters when the foundation consolidated operations in 1983. In 1986 he became coordinator of RCSA's newly organized and expanded grants program. He was director of programs for science research and education when he was appointed vice president in 1992.

"This was an era where you didn't wait for proposals to come in," said former RCSA President John P. Schaefer. "You went and walked the halls. You found the good ideas. Brian would ferret out promising young people. And a lot of those people came to be significant players in the field of science and technology." "Brian had an incredible ability to relate to people," Schaefer said. "He had the evangelical spirit that drove him to find potentially fertile ground for the seeds Research Corporation could plant."

Andreen leaves a legacy at RCSA, CUR, and the



Brian Andreen, 1977

countless colleges and universities impacted by his work. The Partners in Science program, through which RCSA funded research opportunities for high-school science teachers to work with research scientists at colleges and universities nationwide from 1988 to 1999, continues today under the sponsorship of the Murdock Trust. The Cottrell Scholar Program continues to grow in impact, having championed more than 500 outstanding early career teacher-scholars in chemistry, physics, and astronomy since it began in 1994. And CUR, which Andreen served as executive secretary from 1979-1987 and as a guiding force for many years, has grown into an organization with nearly 700 institutional and more than 13,000 individual members from around the world.

Andreen is survived by his wife, Jacqueline, and four children: Karin, Laurie, Carole and Eric.

2022 Financial Summary





Net Assets at Beginning of Year **\$239.1 million** Net Assets at End of Year **\$189.3 million** The financial activities of Research Corporation for Science Advancement were audited by Beach Fleischman, PC. For the complete audited financial statements, please visit our website at **rescorp.org**.

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