RCSA Annual Report

2009

America's First Foundation
Dedicated Solely to Science

RCSA provides catalytic funding for grants, conference and advocacy to support:

- Early career faculty
- Innovative ideas for transformative research
- Integration of research and science teaching
- Interdisciplinary research
- Building tomorrow's academic cultures

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President's Message

Situations such as the current economic downturn provide a crucial opportunity for philanthropy. Therefore, RCSA neither cut programs nor reduced funding in 2009. Furthermore, we are well into the process of implementing two new ambitious programs and modifying our existing programs for greater effectiveness.

Now more than ever, we believe that RCSA must boldly step to the fore, focus on long-term goals, and support our community. Funding constraints and cutbacks are putting the U.S. science community at risk, and no single group of scientists is more at risk than those just starting their careers. For almost a century RCSA has focused precisely on this group of early career researchers and educators, and we will continue to do so in these stressful economic times.

At RCSA we recognize the severe challenge before us, and we are cognizant of the urgent responsibility it entails. Whatever the future brings, it is clear that our emphasis must remain on increasing the quality, effectiveness and impact of the programs and grants we fund. That is what the principles of good stewardship have always demanded.

In the next 24-36 months, the ongoing economic challenge undoubtedly will provide numerous opportunities for the nation's private foundations to think and act creatively, perhaps even to come together to support common aspirations and to move in profoundly new and more promising directions. In the realm of scientific research, RCSA promotes collaboration and boundary-crossing initiatives; we predict these pathways can also come to be seen as effective philanthropic pathways to problem-solving in a harsh financial environment.

At RCSA we are privileged to have the opportunity to continue to make a difference in the lives of scientists who will, throughout their professional careers, work to build and maintain a healthy productive life for our nation through research and the continued education of future generations.

James M. Gentile
President & CEO

2009: Programs in Transition: A Year to Rededicate and Advance

The hallmark of Research Corporation for Science Advancement (RCSA), America's second-oldest foundation, created in 1912, has been its nimbleness and its ability to quickly adapt to an ever-changing world.

Nowhere was that willingness to change more evident in 2009 than in enhancements to the Foundation's current Cottrell College Science Awards program and in the progress achieved in the creation of an entirely new program called Scialog®. These moves were seen as increasingly necessary, given a number of trends in science as well as changing conditions in the global economy and mounting pressures due to global climate change and other looming challenges.

As noted in last year's Annual Report, a major influence in the Foundation's thinking on these matters has been the National Academies' 2007 publication of *Rising above the Gathering Storm: Energizing and Employing America for a Brighter Future.* It paints a stark picture of an America that is failing to maintain its leadership in science education and basic research, two endeavors that have provided immense benefits in technological progress, economic growth and quality-of-life improvements over the past 60 years.

"Investments in research and development are among the highest-payback investments a nation can make. Over the past 50 years technological innovation has been responsible for as much as half of the nation's growth in productivity," according to the 2005 congressional testimony of Arden L. Bement, director of the National Science Foundation.

Gathering Storm notes that the United States now ranks 27th among developed nations in the proportion of college students receiving undergraduate degrees in science or engineering, and points out that this is unacceptable in a global economy in which other nations are making dramatic progress in these areas.

Consideration of these broad factors led to a refocusing of RCSA's vision in 2009, so that in all of its convening, advocacy and awards programs the Foundation is concentrating on building academic cultures that embrace:

- early career science faculty;
- innovative ideas that lead to transformative research;
- integration of research and undergraduate science education;
- interdisciplinary and collaborative approaches to research.

Research Corporation is a small foundation, but one that is big on experience, especially in the area of funding academic-based researchers in primarily undergraduate institutions (PUIs), a major source of students who go on to earn Ph.D.s in science. RCSA is also rich in experience when it comes to funding transformative research – so-called "high-risk/potentially high-reward" experimentation that, in the Foundation's long list of accomplishments, has led to atomic power, rocket science, lasers, MRI scanners, radio astronomy and many other achievements, including the early career funding of nearly 40 Nobel laureates.

The Foundation is confidently moving to leverage this experience and knowledge in order to catalyze solutions to 21st-centry challenges outlined by the National Academies and many others in academia and the science policy community. Relatively limited resources, however, have driven RCSA personnel to think deeply about the Foundation's place in the funding universe as well as how best to capitalize on their expertise and talents.

"We support researchers at PUIs," says RCSA President & CEO James M. Gentile, "because we know the best science educators are those who are also engaged in research. And, at the same time, the evidence indicates that the best learning experience for undergraduate students comes by doing research. So RCSA is concentrating on building this nexus of research and teaching, and we are also taking other measures to help strengthen America's scientific infrastructure."

Cottrell College Science Awards

Thus, in 2009 the Foundation modified its long-standing Cottrell College Science Award (CCSA) program to add a multi-investigator (MI) component; previously, awards went solely to single investigators. The long-standing CCSA program is designed to help early career researchers establish themselves in the research community. Only faculty in the first three years of their first tenure track (or equivalent) academic appointment are eligible. While the single investigator component continues, this new pilot program, known as the MI-CCSA, is aimed at helping start sustainable collaborative programs of research by cross-disciplinary teams of faculty from science departments in PUIs.

RCSA believes that encouraging collaborative science is crucial. The very soul of science lies in collaboration; in days gone by, this was generally accomplished through publication, subsequent attempts at replication and, of course, discussion – often heated – among members of learned societies. Through the MI-CCSA program, RCSA is aiming to accelerate the process of collaboration at the "front end" – in the development of theory as well as in the laboratory – and to increase the acceptance of collaborative science in the PUI community as a whole. While many schools and

departments have encouraged their scientists to pursue interdisciplinary research over the past decade, others have been somewhat slow to change their standards, whether due to regressive administrative attitudes, fear of reduced funding, or inter-departmental jealousies. As *Gathering Storm* and other reports on global competition indicate, the nation can no longer afford to wait for these otherwise quality schools to enter the 21st century.

To receive RCSA funding, the proposed MI-CCSA research project should be one that could not be effectively attacked by an individual researcher or a group of researchers within the same discipline. The funding is aimed at projects that, by their complexity and interdisciplinary nature, require a cross-disciplinary team approach to achieve significant progress and sustainability.

MI-CCSA Objectives

A. Provide funds to advance highly significant research projects that transcend traditional disciplinary boundaries, produce peer-reviewed publications and subsequently attract competitive funding for continuation.

B. Fund projects that will build teams of students and faculty that cross traditional department boundaries.

C. Help early career faculty to establish long-term, sustainable and productive research programs.

D. Advance undergraduates to careers in science.

E. Facilitate the development of an academic culture that supports and encourages cross-disciplinary and collaborative research and teaching.

The program has both institutional and faculty eligibility requirements. Institutional eligibility is limited to colleges and institutions that have achieved a significant level of success in the Single Investigator CCSA program during the past 10 years (a list of these schools is available on the RCSA website). An eligible team consists of at least two, and no more than three, science faculty from two different departments within the same institution. At least one team member must be from chemistry, physics or astronomy, and while one person may be a tenured faculty, the remaining members must be tenure-track faculty within six years of their first faculty appointment. Awards are $75,000 and $100,000 for two- and three-member teams, respectively. All awards require an institutional match of $25,000.

Beginning in 2009 the MI-CCSA was run as a pilot project for three years with the intention of determining its potential to facilitate cooperation across disciplinary boundaries in PUIs, build sustainable programs of cross-disciplinary research and facilitate an academic culture for teaching and research in the sciences that transcends traditional disciplinary boundaries.

In this first year, seven MI-CCSA awards were made, to two public and five private institutions, for a total of $575,000. Two of the awards were to three-member teams and five awards were to two-member teams. Collectively, the awards involve 16 science faculty – five from biology, seven from chemistry, one from mathematics, and three from physics. The average support provided per faculty member comes to $35,937. Sixty-nine percent of the awardees are within the first six years of their first faculty appointments, and 44 percent are female.

Meanwhile, in the Cottrell College Science Awards – Single Investigator program (SI-CCSA), the 2009 review process yielded a total of 61 awards totaling $2.46 million.

Creating Scialog®

In 2009 RCSA's most direct attempt to accelerate the pace of breakthrough scientific discovery was rapidly taking form. It is an entirely new program called Scialog, first announced in the Foundation's 2007 Annual Report.

In developing this new initiative and its first three-year round, on the topic of solar energy conversion, RCSA scientists participated in three solar-related research conferences. They surveyed several hundred scientists and analyzed their responses, developing the Scialog request for proposals and related pre- and full-proposal electronic forms. They also took these opportunities to promote the nascent initiative among solar researchers. The process of building a panel of experts to review the proposals and make recommendations on awards (scheduled for April 2010) was well underway in 2009.

Applicants were drawn from a broad spectrum of universities across the country, including UC-Berkeley, USC, Cornell, Princeton, MIT, Penn State, Texas A & M, University of Washington, University of Florida, University of Minnesota, Northwestern University, Washington University, UT-Austin and University of Arizona, as well as from research-active PUIs such as Franklin and Marshall College, Idaho State University and California State University-Northridge. Of the applications received, 63 percent came from chemists, 24 percent from physicists and 13 percent from other fields.

Scialog pre-proposals covered a wide range of fundamental research aimed at (i) development of novel high-performing materials that possess greater stability, lower cost, or offer higher efficiency than materials currently used on solar energy devices; or (ii) innovative, highly efficient methods for solar energy conversion that take advantage of unique chemical or optical properties and are poised to overcome current bottlenecks limiting performance efficiency. The pre-proposals crossed the boundaries of materials science, chemistry, physics and biochemistry and offered a fascinating snapshot of the nature of high-risk/potentially high-reward research in this vitally important area of study. Some examples:

- Use of proteins or other components of biological systems to construct new solar energy conversion systems – either as part of the light-capture process, or for the conversion of water to hydrogen;
- Discovery of new inorganic or organic nanocomposite materials that have especially promising light-capture and/or charge-separation properties;
- Development of new methods for rapid evaluation of photosensitive materials with promise for solar energy conversion;
- Synthesis of new nanomaterials – tubes, wires, rods, crystals and particles – with photon-capture and charge-separation properties;
- Design of new wide band gap materials matched to the solar spectrum;
- Development of new photo-capture and charge-separation materials from inexpensive and nontoxic metal oxides;
- Development of new photo catalysts for water oxidation that are more stable or more easily recycled/regenerated than current catalysts;
- Design of more efficient and stable dyes for dye-sensitized solar cells;
- Development of new hetero-junction organic solar cells;
- Creation of nanostructured thin films for solar energy conversion;
- Design of new organic thin film solar cells.

Scialog is about three things that science advancement entities such as RCSA must encourage in an increasingly challenging global environment – the willingness to conduct risky research, the process of forming communities of knowledge on complex subjects of global importance, and the centrality of open communication and collaboration.

On this last point, the Scialog methodology is shaping up along the lines suggested by the late theoretical physicist David Bohm in his book *On Dialogue*. Foundation personnel reasoned that solving today's increasingly complex problems in science requires not only cross-disciplinary collaboration in the laboratory, but also collaboration beforehand in the creation of transformative ideas. Therefore, in the Scialog initiative, which is essentially an RCSA-run experiment in accelerating collaborative problem solving, the intent is to foster open dialog among early career researchers – traditionally the most creative cohort in science – and more established experts in the field, and subsequently to fund the best research ideas resulting from this interplay of knowledge, vision and sheer youthful audacity.

If, in the process, Scialog participants manage to secure funding from industry or government to continue their projects beyond the three-year round, or, in the best of all possible outcomes, manage to create long-term productive communities of knowledge, the world will be so much the richer. Whatever the outcomes, however, the Foundation fully intends to monitor and evaluate the Scialog experiment, and to build more effective models based on the results. Expect a report on the first-year session in the 2010 Annual Report.

Cottrell Scholars

As noted in *Gathering Storm*, the need for top-quality science education has never been greater in the U.S., but it's also clear that this need has always been present. In 1994 RCSA instituted the Cottrell Scholar Awards (CSA) to empower top early career scientists at the nation's large universities to change the cultures of their academic departments to value undergraduate science education.

"Right now, at many large research universities," says RCSA President & CEO James M. Gentile, "the priority is on research, first; obtaining federal grants to finance it, second; the education of graduate students, third; and the education of undergraduates comes last." He warns that this is not a situation that is conducive to the effective maintenance, much less the necessary improvement and expansion, of the nation's scientific infrastructure in an increasingly competitive world.

Dr. Gentile stresses that RCSA's over-arching goal for the CSA program is to "ensure that American universities rapidly translate cutting-edge research into teaching undergraduates, and to encourage those receiving Cottrell Scholar honors to learn from one another, to build a community of scholar-scientists to address that goal."

He says that RCSA encourages colleges and universities to incorporate undergraduate students into working laboratories so that they can learn "how scientists think and how they approach difficult problems," rather than just learning *about* science from classroom lectures. "Properly supervised undergraduate research provides the very best learning opportunities," Dr. Gentile says. "It gives American science students a practical and intellectual edge in international science."

In July 2009, 25 Cottrell Scholars attended the 15th Annual Cottrell Scholar Conference held in Tucson, AZ. The featured speakers were Harry Gray, the Arnold O. Beckman Professor of Chemistry and founding director of the Beckman Institute at the California Institute of Technology, and Robert Full, director of the Poly-PEDAL Lab and professor of integrative biology at the University of California, Berkeley.

Dr. Gray discussed how he is involving college and high school students across the nation in a "solar army" to engage in research to identify promising materials for solar cells. Dr. Full gave a talk on integrating teaching and research and developing a program of interdisciplinary research.

Cottrell Scholar Richard Taylor, professor of physics, psychology and art at the University of Oregon, also delivered a presentation at the conference, discussing the process of developing interdisciplinary research and involving students in the mix.

An important feature of the Cottrell Scholars Conference has always been the opportunity it provides for the honorees to interact professionally with colleagues across disciplinary boundaries and to address issues pertinent to science education. General discussion at the 2009 conference indicated a strongly perceived need for greater interconnectivity and communication among Cottrell Scholars in order to improve the general attitude toward undergraduate science education. Foundation personnel interpreted that discussion as a mandate to update and enhance the CSA program over the next few

years; by the end of 2009, RCSA officials had already begun planning improvements to the CSA conference and modifications to the fundamentals of the award itself.

Also in 2009 RCSA granted 10 Cottrell Scholar Awards, out of 134 applications, at $100,000 each. Of the 10 awardees, three were women.

Arizona Partners in Science

Arizona Partners in Science is a program aimed at improving the quality of high school science education and increasing the number of students who choose science careers. RCSA created the Partners program in 1988, and during the ensuing decade it awarded roughly 290 grants for the collaboration of high school teachers and natural science faculty at about 100 colleges and universities across the nation. Robert H. Grubb, of Caltech, a 2005 Nobel laureate in chemistry, received one of the first Partners awards to work in collaboration with a science teacher at South Pasadena High School. In 1990 the M.J. Murdock Charitable Trust joined RCSA in funding the program in the Pacific Northwest, an activity that continues today. Although RCSA discontinued the nationwide program in 1999, the Foundation rejoined the Murdock Trust in this endeavor in 2008 to bring Partners opportunities to Arizona high school teachers. A full discussion of the Arizona Partners program appears on the RCSA website, and, with the assistance of three consultants, Lisa Elfring, molecular biology, UA; Don Adams, science teacher, Vail High School; and Jamie Leopold, RCSA, the Foundation is encouraging and assisting local high school teachers to establish research partnerships with UA faculty.

In 2009 RCSA received 12 proposals and made eight $15,000 awards. Each two-year award offers summer stipends for the high school teacher, and covers expenses for supplies as well as travel to the annual Partners in Science National conference in San Diego, CA. All teacher participants are required to attend and present at a UA poster session, and at the national conference. The 2009 awardees conducted their research under the supervision of UA faculty from chemistry, nutritional science and molecular and cellular biology, the UA's interdisciplinary Bio5 Institute, plant sciences, ecology and evolutionary biology, and the Center for Applied Spatial Analysis.

In 2009 RCSA continued to pilot the program among the University of Arizona and Tucson-based high school teachers, with the hope that additional collaborators would appear to support all three Arizona state universities in the years to come.

Conclusion

The sudden economic downturn of 2008 affected many philanthropic entities; in 2009 a few ceased operation entirely. RCSA's endowment suffered a major shock, as did those of most foundations. But the men and women of RCSA preferred to interpret this unfortunate turn of events as a call to action, a unique opportunity to identify and achieve breakthrough methodologies and procedures. They chose to become even more effective at what they do, guided, perhaps, by the words of Sir Ernest Rutherford, Nobel laureate in physics: "Gentlemen, we have run out of money. It is time to start thinking."

Buoyed by a supportive Board of Directors, and armed with valuable advice from the Foundation's newly formed Presidential Advisory Board, RCSA President & CEO James Gentile elected to stay the course in the creation of Scialog, and to continue reordering the Foundation and its programs to better address 21st-century challenges. As Marcus Aurelius observed two thousand years ago, "The universe is change; our life is what our thoughts make it." That truth is nowhere more evident than in the realm of science and the pursuit of a better tomorrow; in 2009 Research Corporation for Science Advancement rededicated itself to that pursuit.

2009 Honorees

Cottrell College Science

Megan Alameda Ferguson, SUNY at New Paltz, *Chemical Structure and Function of Membrane-Bound Biosurfactants Produced by Pseudomonas Pitida* - $28,928

Andrew Alton, Augustana College, *Model Independent Searches for Physics beyond the Standard Model in Data with Two Bosons* - $43,736

Kristopher Anderson, Northern Arizona University, *First-Principles Study of Oxide Interfaces for Solar Energy Applications* - $$25,811

Margaret Benoit, College of New Jersey, *Full 3D Receiver Function Common Conversion Point Stacking with Verification from Synthetic Seismograms for the Afar Hotspot* - $44,000

Carlos Bertulani, Texas A&M University, Commerce, *Nuclear Astrophysics with Rare Nuclear Isotopes* - $44,418

Sonja Braun-Sand, Chemistry, University of Colorado, Colorado Springs: *Mechanistic studies of ligand inhibition of hexokinase isozymes using computational and experimental methods*- $45,000

Lillian Childress, Bates College, *Manipulation of Individual Nuclear Spins in Diamond* - $45,000

Daniel Curtis, California State University, Northridge, *Measurement of the Angular Scattering Properties of Los Angeles Area Particulate Matter: Application to Climate and Visibility* - $43,184

Andrew Dawes, Pacific University, *Low-Light-Level Nonlinear and Quantum Optics via Light Confinement in an Anisotropic Magneto-Optical Trap* - $43,373

Christopher Goh, Chemistry, Williams College: *Combinatorial Approaches to the Discovery and Systematic Study of Atom Transfer Radical Polymerization Catalysts*-$44,952

Stephen A. Habay, Chemistry, Salisbury University: *Synthesis of decahydroquinolines by inverse electron demand controlled intramolecular Diels-Alder reactions of oxazolium ions*-$54,254

Jessica Hollenbeck, Trinity University, *Designed Ankyrin Repeats as Scaffolds for Multivalent Recognition* - $40,000

Stephanie Hurst, Northern Arizona University, *The Next Generation of Sandwich Complexes: Understanding How Palladium, Platinum and PAHs Can Create New Types of Networks* - $29,454

Andrew Lampkins, Samford University, *Bridging the Gap between Potent Peptides and 'Druggable' Molecules: Development of Bioavailable Leucine-Based Gamma –Lactone Prodrugs* - $42,220

Richard Lavrich, College of Charleston, *Determination of the Secondary Structures Adopted by Small Gas Phase Peptides and Peptidomimetics through Torsion-Rotation Interactions in Rotational Spectra* - $45,000

Janelle Leger, Western Washington University, *Understanding Electronic Charge Carrier Motion in Organic and Hybrid Thin Films* - $45,000

Richard S. Lepkowicz, Physics, Rose-Hulman Institute of Technology: *Multi-photon confocal microscopy of self-assembled metal-ligands at the polymer interphase in multi-layered polymer films*-$43,826

Philip Lukeman, California State Polytechnic University, Pomona, *Positional Photocleavage Control of Nucleic Acid Nanoswitches* - $35,684

Theresa Lynn, Harvey Mudd College, *Photon Pair Entanglement in Multiple Degrees of Freedom for Quantum Communication* - $41,718

Laura MacManus-Spencer, Union College, *A Mechanistic Investigation of the Role of Suspended Particles on the Photochemical Degradation of Emerging Contaminants in Surface Waters* $43,036

Weining Man, San Francisco State University, *Bandgap Study of Photonic Crystals and Quasicrystals* - $39,948

Douglas Martin, Lawrence University, *Measuring the Bending Stiffness of Mirotubules with Varying Protofilament Number* - $39,584

Laura McCunn, Chemistry, Marshall University: *Characterization of Radical Intermediates in the C2H3 + O2 Reaction*-$43,954

James McGarrah, SUNY Genseo, *Capturing Aggregates of Luminescent d8 Compounds in Homogeneous Solutions: Modeling Phosphorescent Dopants in OLEDs* - $42,583

Christopher Morgan, United States Naval Academy, *Probing the Structure of Quasar Accretion Disks by Analysis of Microlensing in Gravitationally Lensed Quasars* - $39,348

Christopher C. Mulligan, Chemistry, Illinois State University: *On-Site Monitoring of Emerging Environmental Contaminants with Ambient Mass Spectrometry*-$43,950

Kathryn Muratore, Chemistry, American University: *Knowledge-based redesign of enzymes to identify substrate specificity determinants*-$44,993

Jeffrey Myers, Davidson College, *Folding and Misfolding of Myelin Protein Zero Mutants Implicated in Peripheral Neuropathy* - $44,536

Peter Oelschlaeger, California State Polytechnic University, Pomona, *Studying the Evolution of Metallo-Beta-Lactamases and Their Role in Antibiotic Resistance through a Combined Computational and Experimental Approach* - $37,432

Jennifer Palenchar, Villanova University, *The Characterization of an Unusual Beta-Hydroxybutyrate Dehydrogenase and its Role in Trypanosome Energy Metabolism* - $30,700

Gopal R. Periyannan, Chemistry, Eastern Illinois University: *Biomass Conversion: Proteomic Identification of Glycoside Hydrolases from Caulobacter crescentus*- $41,175

Jai-Pil Choi, California State University, Fresno, *Electrochemical and Optical Spectroscopic Studies on Gold Nanoparticle Properties – Effect of Nanoparticle Surroundings* - $45,000

Hendrik Postma, Physics, California State University, Northridge: *Mesoscopic Ion Transport in Graphene Nanopores*-$34,984

Rachel Powers, Grand Valley State University, *Structural Analysis of Mutants of the Antibiotic Resistance Enzyme P99 Cephalosporinase* - $44,895

Guy Ramon, Santa Clara University, *Theoretical Study of Decoherence Effects and Quantum Control of Spin Qbits in Semiconductor Quantum Dots* - $43,656

Joseph Reczek, Chemistry, Denison University: *Development of Modular Organic Columnar Liquid Crystals as Robust Sensitizers in Low-Cost Solar Cells*-$41,682

Stephen Remillard, Hope College, *Nonlinear Electrodynamics of Superconducting Thin Films in Microwave Fields* - $43,815

Eric Ross, Gonzaga University*, Development and Characterization of Supported Lipid Bilayers within Mesoporous Silica Substrates* $35,313

Francis Rossi, SUNY College at Cortland, *A Facile Method for the Preparation of Cell-Permeant Caged Peptides Using Click Chemistry* - $38,471

Yann Schrodi, California State University, Northridge, *Development of Trinuclear Zirconium Complexes for the Activation and Reduction of Nitrogen* - $45,000

Steven Shipman, New College of Florida, *Multi-Dimensional Rotational Spectroscopy of Molecules at Room Temperature* $38,546

Monika Sommerhalter, California State University, East Bay, *Transforming Chloroperoxidase into a Practical Biocatalyst* - $36,000

Ryan Sours, Towson University, *A Chromatographic Phage-Display Technique for Identifying Peptides that Inhibit Calcium Oxalate Monohydrate Crystal Growth* -$44,100

Paul C. Spiegel, Jr., Chemistry, Western Washington University: *Deciphering the Roles of the Ribosomal Translocases in the Regulation of Translation*- $44,661

Frederick Strauch, Williams College, *Efficient Quantum Routing in Superconducting Qubit Networks* - $40,218

Marianne Takamiya, University of Hawaii at Hilo, *Extinction and Star Formation Rate Maps in Nearby Galaxies* - $42,056

Christopher Tycner, Central Michigan University, *Investigating the Connection between Rapid Stellar Spin and Disk Formation Mechanisms in Early-Type Stars* - $29,366

Laura Voss, Bowdoin College, *Multiplex Coherent Anti-Stokes Raman Spectroscopy of Optically Trapped Aerosols to Study Oxidation and Growth Mechanisms* - $44,900

Xin Wen, California State University, Los Angeles, *Effects of Hofmeister Anions on Antifreeze Protein Activity* - $45,000

Gregory Wurtz, University of North Florida, *Near-Field Optical Scattering from Defect-Mode Plasmonic Crystals* - $45,000

Judy Zhang, Chemistry, Southern Illinois University, Edwardsville: *Reductive Transformation of Organic Sulfoxides by Iron Oxides and Reduced Organic Matter*-$45,000

Zhengtao Zhu, South Dakota School of Mines and Technology, *Probing the Interactions between Conjugated Polymer and ZnO Nanostructure through Nanostructure Surface Engineering* - $40,000

Cottrell Scholars

Lane Baker Department of Chemistry, Indiana University: Instrumentation and Development of New Techniques for Measuring Molecular Recognition with Ion Currents-$100,000

Penny Beuning Department of Chemical Biology, Northeastern University, Boston: At the Interface of Chemistry and Biology: Integrating teaching and research on mutagenic DNA polymerases-$100,000

Michael David Gladders Department of Astronomy, University of Chicago: The Second Red-Sequence Cluster Survey:100 Million Galaxies for the Masses-$100,000

Duncan Lorimer Department of Physics, West Virginia University: Bursts, flickers and cosmic flashers -- exploring the transient radio sky-$100,000

Robert McDermott Department of Physics, University of Wisconsin: Noise and Cooperative Phenomena in Amorphous Dielectric and Magnetic Systems-$100,000

Maura McLaughlin Department of Physics, West Virginia University: Detecting Gravitational Waves Using Pulsar Timing: Drift-Scan Searches for Millisecond Pulsars-$100,000

Scott Alan Snyder Department of Chemistry, Columbia University: Achieving Synthetic Control When Nature Abandons Selectivity: Total Synthesis of Oligomeric Natural Products-$100,000

Snezana Stanimirovic Department of Astronomy, University of Wisconsin-Madison: The dynamic interstellar medium: confluence of observations and numerical simulations-$100,000

Rory Waterman Department of Chemistry, University of Vermont: Catalytic Methods to Low-Valent Phosphorus -$100,000

Yadong Yin Department of Chemistry, University of California, Riverside: Self-Assembly of Superparamagnetic Colloids to Field-Responsive Photonic Crystals-$100,000

Arizona Partners in Science

Dr. Eugene Arthur Mash, Jr., University of Arizona and Gayle Brickert-Albrecht, Tucson High Magnet School: Synthesis of Contrast Agents for Targeted Magnetic Resonance Imaging

Dr. Vicki L Chandler, Bio5 Institute and Lynne Marie Cote, Mountain View High School**:** Genetic and Molecular Characterization of Mutations that Affect Gene Silencing

Dr. Gary L. Christopherson, University of Arizona and Don Adams, Vail High School: Managing Landscapes for Wildfire: Restoring Fire Balance in the Catalina-Rincon Mountains

Dr. Stephen G. Kukolich, University of Arizona and Bryan Sargus, Catalina Foothills High School: Measurements of Microwave Spectra and 3-D Structures of Transitiion Metal Complexes

Dr. Emmanuelle Joelle Meuillet, Ph.D, University of Arizona and Maria Luisa Ruiz, Luna of City High School: Development of Novel Anti-Cancer Drugs for the Treatment of Colon Diseases

Dr. Katrina M. Miranda, University of Arizona and Phoebe Goodwin, San Miguel Catholic High School: Mechanistic Analysis of Nitrogen Oxide Chemistry under Biologically Relevant Conditions

Dr. Nancy A Moran, University of Arizona and Margaret Wilch, Tucson High Magnet School: Exploration of the Microbiota Associated with Honey Pot Ants, Myrmecocystus species, using DNA sequencing methods

Financials

Research Corporation for Science Advancement's condensed statements of activities and changes in net assets for the years ended December 31, 2008 and 2009 are presented in this section.

The foundation's audited financial statements for 2008 and 2009 are available on the RCSA website http://www.rescorp.org/about-rcsa/publications/audited-financials

Condensed Statements of Activities and Changes in Net Assets

Years Ended December 31, 2009 and 2008

Revenues	**2009**	**2008**
Investment Income (Loss) Net	30,914,472	(57,401,286)
Other Income		23,580
Total Revenues	30,714,472	(57,377,706)
Expenses		
Grants Approved	4,156,965	6,345,827
Program Related		325,000
Science Advancement	1,315,182	1,637,144
Information and Communications	225,167	307,084
General and Administrative	1,678,241	2,046,845
Other	679,166	632,718
Total Expenses	**8,054,721**	**11,294,258**
Change in Net Assets	22,859,751	(68,671,964)
Net Assets-Beginning of the Year	98,837,500	167,509,464
Net Assets-End of the Year	**121,697,251**	**98,837,500**

Condensed Statements of Financial Position

December 31, 2009 and 2008

Assets	**2009**	**2008**
Investments	13,741,673	112,479,649
Cash and Cash Equivalents	681,299	1,987,535
Other	680,648	838,982
Total	139,582,083	116,865,124
Liabilities and Net Assets		
Liabilities		
Grants Payable	3,535,259	4,491,692
Line of Credit	10,200,000	9,625,000
LBT Liability	1,478,199	1,548,970
Other	267,374	2,361,962
Total	17,884,832	18,027,624
Unrestricted Net Assets	121,697,251	98,837,500
Total	**139,582,083**	**116,865,124**

Board of Directors

Patricia C. Barron is chair of the Board of Directors. She is a corporate director and is retired from the position of clinical associate professor at the Leonard N. Stern School of Business, New York University. She is also chair of the RCSA Executive Committee.

G. Scott Clemons is managing director of Brown Brothers Harriman & Co. He is a member of the Finance Committee and the Science Advancement Committee.

Peter K. Dorhout is vice provost for graduate studies and assistant vice president for research at Colorado State University. He is chair of the Science Advancement Committee and a member of the Executive Committee and the Audit Committee.

James M. Gentile is president & CEO of Research Corporation for Science Advancement. He is a member of the Executive Committee.

Robert B. Hallock is a distinguished professor in the Department of Physics at the University of Massachusetts at Amherst. He is chair of the Science Advancement Committee, and a member of the Governance and Nominating committees.

Robert Holland, Jr. is an industry partner with Williams Capital Partners. An RCSA director emeritus, he is a member of the Governance and Nominating committees and the Finance Committee.

Brent L. Iverson is a professor of chemistry & biochemistry at the University of Texas at Austin. He is a member of the Finance Committee.

Gayle P.W. Jackson is president of Energy Global, Inc. She is chair of the Audit Committee, and a member of the Executive Committee and the Governance and Nominating committees.

Suzanne D. Jaffe is president of S.D.J. Associates. She is chair of the Finance Committee, a member of the Executive Committee, and the Governance and Nominating committees.

Seth Lederman is Associate Professor at Columbia University and a founder of biopharmaceutical companies, including Vela, Targent, Krele and Plumbline Pharmaceuticals. He is a member of the Audit Committee and the President's Advisory Council.

Elizabeth McCormack is dean of Graduate Studies and professor of physics at Bryn Mawr College. She is a member of the Science Advancement Committee.

Patrick S. Osmer is vice provost for graduate studies and dean of the Graduate School of Ohio State University. He is chair of the Governance and Nominating committees and a member of the Executive Committee.

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Western Washington University

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Oregon State University

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Macalester College

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Research Corporation for Science Advancement

Susan M. Kauzlarich
Department of Chemistry
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John Koh
Department of Chemistry & Biochemistry
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Elizabeth McCormack
Department of Physics
Bryn Mawr College

Mats Selen
Department of Physics
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Nobel Laureate, Physics; University of British Columbia; University of Colorado, Boulder.

Staff

James M. Gentile, Ph.D., President
gentile@rescorp.org

Jack R. Pladziewicz, Ph.D., Vice President
jrp@rescorp.org

Danny Gasch, Chief Financial Officer
dgasch@rescorp.org

Linda Neefe, Executive Assistant to the President
neefe@rescorp.org

Science Advancement Program
Kathleen Parson, Ph.D., Program Officer
parson@rescorp.org

Silvia Ronco, Ph.D., Program Officer
sronco@rescorp.org

Richard Wiener, Ph.D., Program Officer
rwiener@rescorp.org

Assistants
Sandy Champion, Lead Program Assistant
sandy@rescorp.org

Sofia L. Morris, Office Coordinator
sofie@rescorp.org

Vivian L. Wessel, Coordinator Strategic Initiatives
vivian@rescorp.org

News and Publications
Dan Huff, J.D., Science Writer
dhuff@rescorp.org

Archives
Dena McDuffie, Archivist
mcduffie@rescorp.org

Information Technology
Tommy Goodenow, Network Administrator
tommy@rescorp.org

4703 East Camp Lowell Drive, Suite 201, Tucson, Arizona 85712
Phone: 520.571.1111 Fax: 520.571.1119
www.rescorp.org