

Advancing science since 1912

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

For 100 years Research Corporation for Science Advancement (RCSA) has supported innovative young researchers. RCSA provided key funding, often with a first-time award, for those who achieved breakthroughs in rocketry, atomic physics, optics and other technologies. If you have navigated a major city with GPS, undergone an MRI, or watched a laser-scanned DVD, you have benefited from RCSA's basic research funding.

Begun in 1912 by Frederick Gardner Cottrell, a scientist-entrepreneur-philanthropist, RCSA is the oldest foundation in the United States devoted wholly to science. It focuses on providing catalytic and opportunistic funding for high-risk scientific research and the development of academic scientists. The emphasis is on the physical sciences—chemistry, physics and astronomy—and closely related fields such as biochemistry and biophysics.

Through conferences, grants and advocacy, RCSA supports:

- Early-career faculty
- Innovative ideas that lead to transformative research
- Integration of research and undergraduate science education
- Interdisciplinary and collaborative approaches to research
- Building academic cultures that embrace all of the above

RCSA is an active, hands-on foundation. Its mission is one of partnership rather than ownership. RCSA is nimble, adapting to new situations and responding to new opportunities. RCSA works in strategic niches to advance America's competitiveness in science and technology.

“Bet on the youngsters. They are long shots but some of them pay off.”

**Frederick Gardner Cottrell,
founder of RCSA**

“We are willing to take action to stimulate change in how science is taught and how research is conducted. It is up to the foundations and visionary thinkers of this country to continue supporting great ideas that may lead to advances in our society. This is Cottrell's legacy that we proudly continue into RCSA's second 100 years.”

James Gentile, President and CEO

RCSA's four programs provide financial and collaborative support to academic scientists. Because student researchers play an integral part in the work of scientists supported by RCSA, our programs enhance the numbers and quality of young people who choose science as a career.

Scialog® (science+dialog)

The Need: Accelerate breakthroughs in complex challenges of global concern.

The Program: Scialog, a multi-year program with synergistic components, is a research process for accelerating solutions to complex global problems. Scialog provides grant support for early-career faculty whose research is judged to be highly innovative, combining high-risk research with potentially high-reward outcomes. Scialog Fellows meet annually to develop interdisciplinary collaborations and identify bottlenecks and potential breakthroughs that may achieve transformative outcomes. At the close of each conference, additional resources are offered to support collaborations for interdisciplinary research. RCSA's current Scialog initiative addresses the challenges of improving efficiencies in solar energy conversion to electricity and fuels. Scialog Fellows are physicists, chemists, materials scientists and engineers who are working on such out-of-the-box projects as integrating quantum dots with a modified plant protein to generate electricity, and upconverting low-energy photons into higher energy states in inexpensive and abundant polymer materials.

Outcomes: The first Scialog was launched in 2010, thus outcomes are preliminary. Twenty-three Scialog Fellows have received awards totaling \$2.5 million. Six additional collaborative projects, involving interdisciplinary teams formed at Scialog conferences, are under way, all focused on solar energy conversion. Social science research done on the professional relationships formed at the conferences indicates that the Scialog process is effective for rapidly catalyzing collaborations among scientists.

Cottrell Scholar Program

The Need: 1) Increase the retention of undergraduate students in science majors in the nation's research universities. Currently, on average, 50% of freshmen who indicate an interest in majoring in science abandon the field, primarily after their freshman or sophomore year. 2) Encourage university scholars to integrate research and undergraduate teaching.

The Program: The Cottrell Scholar Award program creates a community of scientist-educators within and among research universities. Grants are provided to early-career faculty in the physical sciences and related fields whose proposals are judged outstanding for both their research ideas and their ideas for teaching undergraduate students. Only scholars from Ph.D.-granting institutions are eligible. Cottrell Scholars meet annually to share teaching approaches, learn from senior scientists, connect with leaders in national initiatives for STEM education, and identify approaches to change the culture of their own universities toward valuing undergraduate teaching. RCSA provides additional funding for the best projects that emerge from the conference.

The Cottrell Scholar Collaborative encourages networking throughout the year, empowering Cottrell Scholars to become outstanding scholar-educators as well as tomorrow's academic and scientific leaders. Through this program RCSA is building a national community of outstanding scholar-educators committed to maintaining America's global scientific leadership through their research and their impact on undergraduate students.

Outcomes: Today, 251 Cottrell Scholars are faculty in more than 115 research universities. On average, each Cottrell Scholar works with seven undergraduate students, six graduate students and two post-doctoral fellows. Cottrell Scholars receive national awards and recognition in significantly higher proportion than their counterparts. They are collaborating to implement effective teaching of undergraduates, particularly freshmen and sophomores, resulting in greater retention of these students in science majors. Once exposed to effective teaching methods, Cottrell Scholars continue using these skills throughout their careers.



Cottrell College Science Awards



The Need: 1) Increase the number of undergraduate students majoring in science at the nation's primarily undergraduate institutions (PUIs). 2) Increase the number of graduates from PUIs who obtain advanced degrees in science. 3) Support the research careers of early-career faculty in primarily undergraduate institutions.

The Program: The Cottrell College Science Awards (CCSA) program provides grants to early-career faculty at primarily undergraduate institutions, both public and private. Research projects must involve undergraduate students. Enabling undergraduate students to participate in research is highly effective for retaining them in science fields, sparking their interest in obtaining graduate degrees and continuing successful careers as scientists. These grants also help faculty achieve lifelong, productive roles as scholar-educators.

Outcomes: CCSA grants frequently develop into long-term research programs and attract additional funding from other agencies. Eligible schools produce a high proportion of graduates who proceed to earn doctoral degrees in the physical sciences.

In 2009, 6,936 U.S. college students received baccalaureate degrees in chemistry from primarily undergraduate institutions (PUIs). Of those, 2,844 (41% of the national total among PUIs) came from institutions that received the bulk of Cottrell College Science Award funding. Fifty percent of the students of professors who received CCSA grants proceed to graduate school. Since 1994 RCSA has supported 2,937 faculty in PUIs. The 237 who are currently being funded have about 800 undergraduate students conducting research in their faculty laboratories.

Partners in Science

The Need: Improve science education in grades 9 to 12, increasing high school graduates who pursue science majors in college and pursue science careers.

The Program: The Partners in Science Program provides summer research opportunities for Arizona high school science teachers in partnership with faculty members at Arizona universities. RCSA has joined with the M.J. Murdock Charitable Trust in a cooperative venture to bring these research opportunities to Arizona. The Murdock Trust supports opportunities for high school teachers in the Pacific Northwest under the Partners in Science name. The Trust convenes the teachers annually at a conference to present their work. At the conclusion of their awards, teachers can apply for supplemental grants to purchase equipment for high school classes.



Outcomes: In 2012 the Vail Academy FIRST robotics team, led by teacher-partner Don Adams, competed in the International FIRST robotics championship in St. Louis, MO. In May 2012 Tucson High School teacher-partner Margaret Wilch received an honorary doctoral degree from the University of Arizona for her excellence in science teaching. Sonoran Science Academy in Tucson teacher-partner Robert Hobbins was named Arizona 2010 Teacher of the Year.

Research Corporation for Science Advancement Milestones

Since 1912 RCSA has supported the work of 18,000 scientists, including the early-career research of 40 scientists who became Nobel laureates, the first in 1934 and the most recent in 2010.

RCSA has provided early-career support for scholar-educators in the physical sciences at major research universities, primarily undergraduate universities, and liberal arts colleges in all 50 states.

Renowned scientists who received research support from RCSA include:

Robert Goddard, the father of modern rocketry

Ernest Lawrence, inventor of the cyclotron atom smasher

Isidor Rabi, whose discoveries led to magnetic resonance imaging (MRI)

Grote Reber, the father of radio astronomy

Robert Van de Graaff, creator of the Van de Graaff generator

Robert Woodward, considered to be the father of organic chemistry

Dudley Herschbach, who demonstrated more clearly how molecules behave

John Atanoff, who built the first prototype computer

Tom Cech, discoverer of the catalytic properties of RNA molecules

Carl Wieman, part of the team that produced the first Bose-Einstein condensate

Ei-ichi Negishi, part of the team that developed palladium-catalyzed coupling in chemistry, which enables the development of new drugs and materials

In medicine, RCSA funds helped:

Barnett Rosenberg, who discovered the anti-cancer drug Cisplatin

George Beadle, who discovered the role of genes in regulating biochemical events within cells

Edward Kendall, who first identified cortisone

Carl Djerassi, developer of the first oral contraceptive

From the 1940s through the 1970s, the foundation supported pioneering research through its Williams-Waterman Fund for the Combat of Dietary Disease. The Fund's accomplishments include the enrichment of flour, cornmeal and other cereal grains in the United States.

In 1992 RCSA became a partner in the international consortium that built Arizona's Large Binocular Telescope, one of the world's most advanced telescopes.

The foundation created a nonprofit corporation to manage the collaboration of more than 100 scientists and engineers and to raise private and agency funding for construction of the Large Synoptic Survey Telescope (LSST) in Chile. Site excavation began in earnest in 2011 with construction expected to take five years.



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