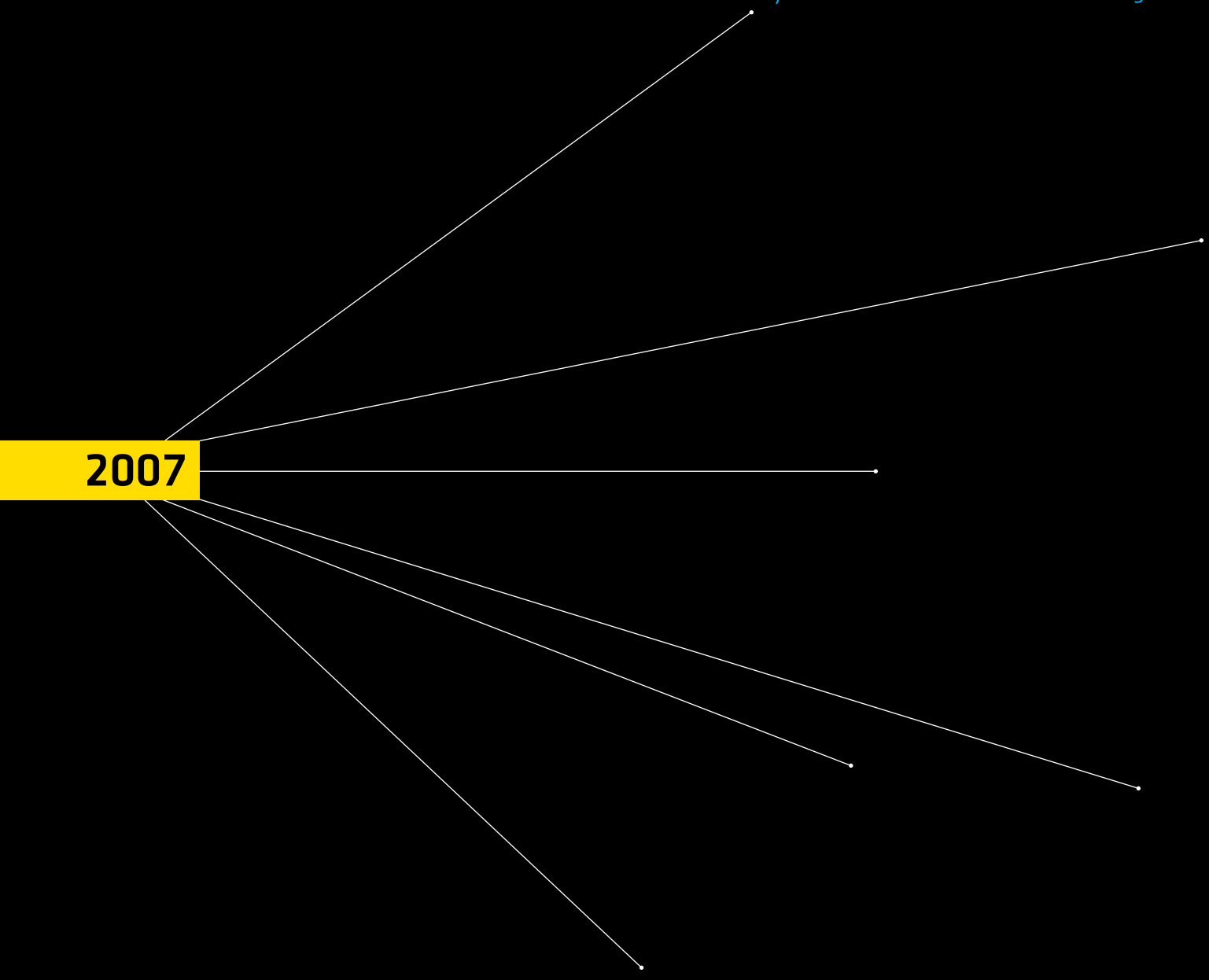
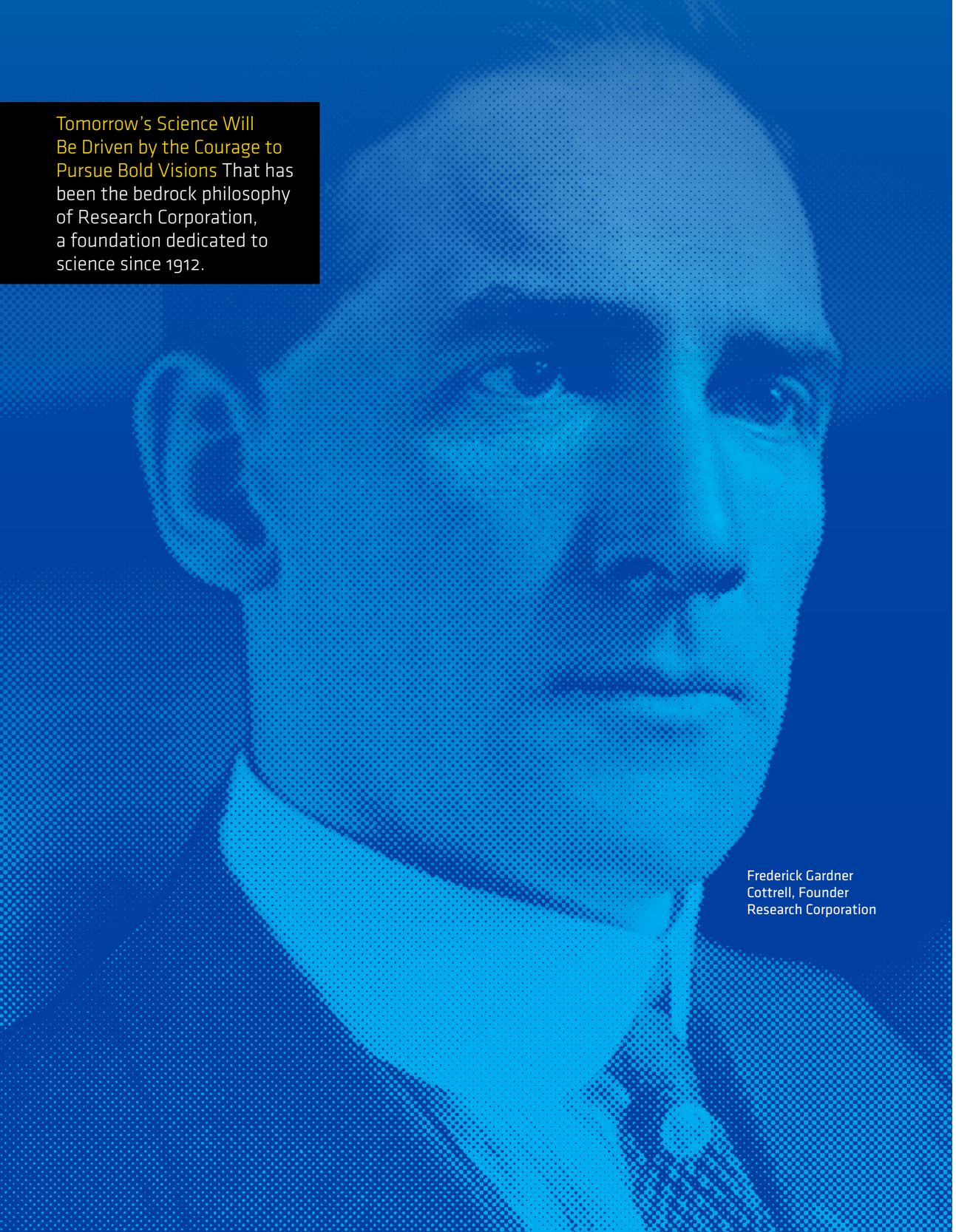
RESEARCH CORPORATION
for SCIENCE ADVANCEMENT

A foundation dedicated to science since 1912.





Tomorrow's Science Will Be Driven by the Courage to Pursue Bold Visions That has been the bedrock philosophy of Research Corporation, a foundation dedicated to science since 1912.

Frederick Gardner Cottrell, Founder Research Corporation

RESEARCH CORPORATION *for* SCIENCE ADVANCEMENT

A foundation dedicated to science since 1912.

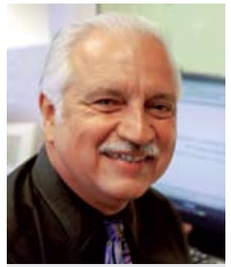
Tomorrow's science will be driven by the courage to pursue bold visions – for nearly a century now, that has been the bedrock philosophy of Research Corporation, a foundation dedicated to science since 1912.

Today, with that basic insight gaining additional power and meaning as research grows increasingly complex, and as the scientific challenges facing humanity grow more urgent, the foundation rededicates itself to the advancement of science. Our new logo (above, left) is meant to evoke the complexity of science and its promising future of collaborative growth based on creative interconnections. If our vision of the future is correct, and if we do our jobs properly, this mark will become a living symbol, with many bold and subtle meanings for scientists and the public in the decades to come.

Strategic Goals

For Research Corporation for Science Advancement to fulfill its mission in today's increasingly complex scientific environment, there is little room for timidity and short-sightedness. Rather than spend down the endowment (as has been the strategy of some private foundations that support science) RCSA undertook a year-long strategic planning effort. One result of this process was the reaffirmation and rearticulation of our mission statement, which reads as follows:

Research Corporation is a foundation for the advancement of science that provides catalytic and opportunistic funding for innovative scientific research and the development of academic scientists, which will have a lasting impact on science and society. The statement encompasses four strategic goals.



James M. Gentile,
President and CEO

President's Message

For 96 years, Research Corporation has been at the forefront of science advancement, contributing quietly, but in no small measure, to the modern era. As the pace of discovery and subsequent technological development broadens and accelerates in today's world, the necessity of change becomes increasingly evident to all. We, the current stewards of this venerable foundation, recognize this necessity and are rising to meet the challenge.

A small but important part of our effort involves a more precise and descriptive name for the foundation itself. Longtime foundation watchers may have noticed the subtle change on the cover of this report: Research Corporation for Science Advancement (RCSA) is now the foundation's official name. Adding part of what heretofore had been merely a tagline ("A foundation for the advancement of science") to our official title does two things: a) it alerts those in academia, where offices of science advancement are common, that we are primarily oriented to assist them, and; b) it hints to others outside academia that we are not the usual sort of corporation focused solely on profits. Also, we've added a new tagline to further clarify that point: "A foundation dedicated to science since 1912."

The foundation's logo has also entered the 21st century. We've replaced the "three gears" of the previous era with a design that more broadly suggests the interconnections and mysteries of the science we challenge research communities to explore in the coming decades.

These modifications in title, logo and tagline are respectful of the foundation's long and colorful history, and acknowledge that those of us working today to fulfill the goals of founder Frederick Gardner Cottrell and his associates are fortunate to stand on the shoulders of giants. In doing so, of course, we are perhaps privileged to see slightly more of the future than they were, and so we are required to adapt this organization to what, to the very best of our thinking, are likely to be the needs of science in the coming century. To put it concisely: While disciplinary-based research will always be important and of significant value, we believe the answers to complex, potentially transformational scientific questions will occur at the edges of disciplinary knowledge and will, of necessity, be increasingly collaborative and demanding of scientists the courage to embrace the risk of pursuing bold visions. This is a pursuit to which early-career researchers and theorists are best suited; and yet, unfortunately, it is a pursuit that puts the careers of this same group of scientists in jeopardy given the traditional environments found at our institutions of higher learning.

Where We've Been

As science writer Randy Wedin noted in Research Corporation's 2005 annual report, "While federal … agencies provide the lion's share of funding for scientific research in the United States, private science foundations have historically played an instrumental role in establishing new fields of science." For those fortunate enough to be associated with this foundation over the past nine decades, it has been an enlightening – and, occasionally, astonishing – intellectual adventure. From the electrostatic precipitator – the first "green machine," a smokestack pollution-control device – developed by RCSA founder Frederick G. Cottrell, to Ernest Lawrence's first big cyclotron at the University of California at Berkeley, to Robert Goddard's "crackpot" experiments with liquid-fueled rockets in 1923, Research Corporation for Science Advancement has provided support and encouragement to academia's bold thinkers and groundbreaking researchers.

"You have to think big to be big."
Claude M. Bristol

Robert Goddard's theories were ridiculed, but he ultimately proved the worth of liquid-fueled rocketry.

RCSA has funded pioneering work in steroids, stereochemistry, laser technology, RNA, nuclear magnetic resonance imaging, and the earliest work of at least 35 Nobel laureates. The foundation has met a broad sweep of scientific challenges, ranging from nearly single-handedly wiping out the nutritional-deficit diseases of pellagra and beriberi to creating the field of radio astronomy through its support and encouragement of Grote Reber.

Since its inception in 1912, the foundation has undergone several major transformations. In those early days the idea of a private, not-for-profit organization was so new that the word "foundation" was not yet in common use; thus the presence of "corporation" in the name at a time when Research Corporation was only the second such entity in the U.S., following the creation of the Carnegie Corporation in 1911.

Initially organized as a company to sell and install precipitators and donate the profits to science, Research Corporation was engaged in a continuing struggle to determine an efficient internal structure as well as to provide maximum benefit to academic researchers. Through it all, Cottrell's stated inclination was to bet on young researchers with bright ideas – a concept that remains central to the foundation's efforts today.

In the decades before World War II and the subsequent chartering of the NSF in 1950, Research Corporation was the pioneering agency supporting academic research programs in the U.S. Before the war, the legendary Vannevar Bush, who was instrumental in creating the NSF, served with other distinguished scientists, engineers, academicians, business and policy experts on Research Corporation's board of directors.

Once the great lesson of the war – namely that advances in basic research yield technological development essential to national survival – was seared into the minds of the nation's political and military leadership, the federal budget for research, at Bush's urging, began its precipitous climb into the millions and beyond. Looking back, no nation in history has spent as much and as widely on basic scientific research as post-WWII America. As an inevitable consequence, the primacy of private funding for science was rapidly eclipsed.

One of the elements integral to the success of RCSA grantmaking has always been the ability to stay "in touch" with the needs and concerns of the scientists we fund, or might potentially fund. Brian Andreen, the now-retired foundation vice president who helped create the Council on Undergraduate Research (CUR), recalled that in the 1950s and early '60s, the foundation's staff scientists would fan out across the nation by train to assess the state of academic research and to evaluate the progress of grantees. The peripatetic travel schedules of RCSA program officers haven't changed, and today they represent one of academic philanthropy's most active cadres of on-site evaluators of scientific research programs. As such, they continue to be an invaluable source of useful intelligence and practical wisdom – both for the scientists and institutions visited as well as for foundation "think-tanking."

Based on its program officers' first-hand assessments of the needs and trends in academic-based research over the years, as well as the reality of massive federal funds aimed in large part at the nation's Research I universities, RCSA re-emphasized its support of scientists at Primarily Undergraduate Institutions (PUIs), and gradually sharpened its focus on assisting early-career researchers.

"Our dilemma is that we hate change and love it at the same time; what we really want is for things to remain the same but get better."
Sydney J. Harris

"Moving at the interface of things is the key. We must move seamlessly through, in between, around, over and under traditional boundaries (disciplines) to seek the answers to the cross-cutting questions of tomorrow. We have to study the connective tissues between subject areas even if that means we learn the subject areas "along the way" rather than in a detailed "up front" mode."
Ted Leonis, Vice President, America Online, 2007

Where We Are

Research Corporation for Science Advancement enjoys a good reputation as a funder of quality science, although the reality is that it is a small foundation when its outlays are compared with the overall monies for science and science education provided by the federal sector as well as by many large private foundations. With an endowment of nearly $170 million, each year of the past decade RCSA has been funding $4 million to $5 million in physical science research programs – chemistry, physics, astronomy – almost exclusively at PUIs. During that same period, it has granted between $1 million to $1.7 million to fund Cottrell Scholars, who come from Research I universities, and who are both dedicated teachers and top-notch researchers.

Of course, those expenditures are dwarfed by federal science funds available in a single year in early 21st-century America, where the total federal support of basic and applied research in the 2009 budget is a proposed $57.3 billion. However, competition for federal research dollars is keen despite the exhausting, bureaucratic nature of the process. Further, the entire funding system seems increasingly skewed toward established researchers, to the detriment of the young researchers who are most likely to come up with the transformative science America will need in the coming decades. Therefore, RCSA's historical focus on supporting faculty early in their careers (and with a highly praised short application process) is perhaps more important than ever in today's volatile world of science.

The foundation's two current programs (Cottrell College Science Awards – focused on PUIs; Cottrell Scholar Awards – focused on Research I schools) are in keeping with RCSA's time-honored, if never formally codified, mission of funding scientists so as to promote individuals as both scholars and educators. Other investments, chiefly partnerships in major optical telescope initiatives, including the Large Binocular Telescope in Arizona and the Large Synoptic Survey Telescope in Chile, are important initiatives that promote collaborations on "Big Science" projects. These efforts – focusing on scholar-educators, and finding ways to promote collaborations on major scientific projects – will continue to be keys for the future of the foundation.

The complexities of future science require collaboration and partnerships.

scialog®

Where We're Going

SCIENCE AT THE BOUNDARIES

It is common to see scientific professional organizations, as well as working groups within the National Academy of Sciences, identify what they believe to be the "Grand Challenges of Science." What is striking when one looks at these lists is the commonality of many grand challenges, including the "housekeeping" issues of educating, training and empowering a new scientific workforce, as well as the strong emphasis on multidisciplinary, systems-based approaches to address highly complex scientific questions. It is also evident from the very nature of the research-focused questions that a lone scientist, working in isolation in her laboratory, would be at a significant disadvantage in addressing the complexities of future science without building collaborations and partnerships that are interdisciplinary in nature.

How a small foundation such as RCSA targets its resources in the current research environment is of critical importance. Being small, and given its history of taking risks, the foundation is well positioned to act as the tip of the funding spear, rather than as merely another bucket of water in a large river of resources. The foundation can, and must, take advantage of its comparative lack of complex infrastructure (which often immobilizes larger funding organizations) to adapt easily and quickly to new and more effective ways of nurturing innovative, emerging areas of research. Ideally, performing this service successfully will help to focus the attention and resources of larger agencies and foundations. Indeed, one could imagine RCSA and other small foundations acting as a "tugboat" to nudge the "supertanker" foundations into better positions to fund higher-risk science.

The key to accomplishing this goal is to build new communities of scientists from a multiplicity of experts in the various disciplines, a task which requires identifying those who engage well with colleagues and then encouraging them to develop a common language to address complex scientific challenges. With this goal in mind, the foundation will initiate an innovative experiment in funding scientific research in 21st-century America.

The Scialog® Initiative

Scialog® seeks to accelerate the work of 21st-century transformational science through funding research, intensive dialog, and community building. Scialog® has been conceived as a research grant program emphasizing annual meetings and the opportunity, encouragement, and expectation to form cross-disciplinary teams. Each multi-year initiative will promote scientific innovation in the face of a complex research challenge that serves as a driver in contemporary science. Successful grantees will be asked to address a few narrowly focused issues on a particular research initiative and to communicate with one another in an annual closed conference environment for the purpose of sharing insights and building further collaborations. The purpose of these meetings is to advance human knowledge by building and strengthening a nationwide community of scientists, many of whom will have many promising years of research ahead of them. Through the give-and-take of community building, it is the foundation's hope that Scialog® participants will be better equipped to tackle even more challenging problems in the future. Success among initiative participants will be measured in terms of subsequent partnerships formed and how research clusters intersect with others in the academy, with the private industrial sector, and with the federal sector to continue promising lines of research.

"I find there is greater unwillingness on the part of people to tell each other their innermost ideas and note that it is extremely prevalent among scientific men, especially when it has to do with their colleagues."
Frederick Cottrell

"The best collaborations come about because we have some money in front of you that you want to get. How's that for a reason?"
Erich Bloch

Community-building and collaboration are both important aspects of the Scialog® experiment.

The initial Scialog® will focus on funding and building research teams to undertake groundbreaking studies in solar energy production. This initiative will be entitled Scialog®:2012 – Photovoltaics, and will be conducted in partnership with Science Foundation Arizona (SFAz), a Phoenix-based 501(c)(3) non-profit, public/private partnership that invests in Arizona's future. Scientists from any college or university in the U.S. will be eligible to apply, and details regarding the application process will be published on the RCSA website (http://www.rescorp.org) in early December, 2008.

AN EXPERIMENTAL APPROACH

Research Corporation for Science Advancement will actively seek to establish other partnerships and will define new research areas in subsequent Scialog® initiatives.

The Scialog® process will be guided by a panel of nationally recognized scientists chosen from the research, scholarly and science-policy communities.

With recent policy reports, as well as our own 2005 annual report, pointing to an evolution in modern research toward greater complexity, it is incumbent upon funders, both public and private, to seek bold and innovative ways to advance human knowledge along these lines. As Brandeis University Professor Gregory A. Petsko noted in the 2005 RCSA annual report, interdisciplinary institutes are still considered experimental: "Anybody who tells you they know how to do it right is fooling themselves…We've got to do a lot more, because we don't know what models work…"

Thus, the Scialog® initiative is a critically important experiment in collaboration and community building as much as it is about promoting great science. And because we regard it as an experiment, RCSA scientists will be actively involved in all aspects of the initiative, as well as site visits to successful grant recipients, in order to better understand both the research progress as well as "what works" in building collaborations and community.

BUILDING COMMUNITY

As previously noted, Research Corporation for Science Advancement has, over the past decade, joined with partners to fund the design and construction of world-class telescopes – large instruments around which congregate communities of astronomers, physicists, mathematicians and theoreticians. Other private foundations have created major facilities for biological and medical research, such as Howard Hughes Medical Institute's Janelia Farm in Virginia, and the Van Andel Institute's facility for cancer research in Michigan.

A common theme among these initiatives is to push science forward by bringing together scientists to work in a common environment and toward common goals.

In building the Van Andel Institute scientific staff, George Vande Woude, the institute's founding director of research, says he deliberately chose to go after early-career researchers because they are less set in their ways, more willing to move, and they are "fearless" when it comes to working with new ideas. But, ultimately, the "prime mover" in any extensive team-building effort in science, says Vande Woude, ever the hard-eyed realist, "is money. That's exactly what drives the process."

Universities also are striving to establish mechanisms to drive collaboration among researchers. At the University of Arizona's innovative BIO5 Institute, Director Vicki Chandler, a plant biologist, notes that despite a long tradition of cross-disciplinary research at the university and an emphasis on informal collaborative programs, "old school" attitudes still produce resistance to cross-disciplinary work. Nevertheless, a bold new paradigm demands change:

"Because of the massive amount of information coming out on genes and proteins," Chandler says, "we can now address questions we weren't able to address in the past. But we can't do it alone – we really need to partner with the mathematicians and computer scientists and engineers."

The Scialog® experiment is another approach to the task of scientific community building. It does not offer a central instrument or a common physical location to bring people together; nor, as with medical-biological research, does it rely on a central paradigm such as an increasingly sophisticated understanding of genetics. Instead it seeks to challenge scientists to address intriguing and important complex scientific questions demanding an interdisciplinary approach. It relies heavily on the promise of new collaborations formed through funding and intensive dialog to attract the best and brightest for these research projects. The focus, though, must be on the problem at hand.

Larry Faulkner agrees. He's the former president of the University of Texas at Austin and current president of the Houston Foundation, who points out that doing interdisciplinary work merely for the sake of interdisciplinary work often doesn't work. "There has to be an overriding interest among the partners in the problem that is being addressed. It's the problem that's important, not the interdisciplinarity." As noted in RCSA's 2005 annual report, "At the heart of interdisciplinarity is communication – the conversations, connections, and combinations that bring new insights to virtually every kind of scientist and engineer." This will best occur among individuals addressing a common problem.

A theoretician's ultimate effectiveness depends on the ability to enlist experimentalists.

The "art" in the experiment that is Scialog®, then, involves paying proper attention to the process, as well as devoting proper respect to the big questions the process is meant to address. This approach of looking for answers to big, or pivotal, questions is somewhat akin to that of the theoretician, whose ultimate effectiveness may depend upon enticing his or her more practically oriented experimentalist colleagues into exploring new areas outside their traditional comfort zones.

Peter Wolyness, of the University of California, San Diego, who, through his interests in chemistry, biochemistry and physics, has developed the leading theory of how proteins fold, says of his role as theoretician: "It's very rare that you could actually figure out all the answers yourself. What you really need to do is to enlist a community to help find the answers. You might be able to set out the question or provide a new way of looking at the problem, but almost always you're going to need the experiments and theoretical developments of others to proceed."

Part of the process, he adds, is to develop a "language" accessible to the cross-disciplinary researchers who take up his challenge – a process RCSA and its partners hope to emulate in the Scialog® program as an essential component of community building. To this end, the annual meetings of grant recipients will be conducted by facilitators whose job it will be to make sure people and groups are communicating and ideas are flowing.

"The combination of education and research may be the most powerful capability the nation can nurture in times of stress and uncertainty."
Leon Lederman, N.Y. Times, 2006

"Our failure to invest in science and to reform math and science education is the second biggest threat to our national security – with only the threat of a weapon of mass destruction in an American city presenting a greater danger."
Hart-Rudman Commission on National Security to 2025

Wolyness notes the general viewpoint has been that although the problems might be interdisciplinary, people will remain disciplinary, and that therefore the work has to be done by teams. "But these teams can be delocalized. They don't all have to be in the same place, and you have to have people who are willing to take some chances on their own."

Another theorist, physicist Robert Austin, of Princeton University, says that when it comes to the need for boundary-crossing research to address complex problems, "The message is getting across." For example, he noted this spring the National Cancer Institute launched an effort to leverage the physical sciences into oncology.

"They staged a major meeting at which three-fourths of the people were physicists and one-fourth were cancer biologists," Austin said. "They locked them in a room for two days – no cell phones, no computers – in order to pick the brains of physicists. They did this because the cancer cure rate has basically flatlined for the last 15 years. And they knew they had to do something dramatically different because they just weren't creating traction any more.

"At the top level people are getting it," Austin said. "But down further I'm not so sure."

The Challenges Ahead

Research Corporation for Science Advancement "gets it." The history of the foundation is one of taking risks and promoting science by thoughtful investment in young scientists. The current situation cries out for more innovative approaches to research in the U.S., as well as the need to pay close attention to how we nurture the next generation of American scientists. Both issues are informed by rising competition from the world community, just as both are affected by the current federal funding malaise.

The American Academy of Arts & Sciences (AAA&S) gets it, too. The organization's June 3 report on the state of U.S. science focuses on two issues: early-career faculty, and high-risk, high-reward, transformative research. Their report challenges those who fund science to find ways through which research grant mechanisms can empower rather than inhibit creative thought, and thus encourage the pursuit of unexpected findings.

The AAA&S is calling for special programs to support emerging, untested, potentially breakthrough ideas, as well as enhanced tolerance for pursuing unanticipated developments within ongoing programs. It recognizes a current – and "troubling" – consensus among federal agencies to shy away from high-risk projects.

"And we're paying a price for that," observes AAA&S consultant John "Jack" Crowley, who says the attitude seems to be that "if you don't know it's going to work, don't put it in your proposal. That thought is too powerfully operating in the system today, the committee believes." Crowley also noted that a National Science Board report last year concluded, among other things, that "public support of careful investment in paradigm-challenging ideas is critical not only to continued economic growth, but also to the future welfare of our nation."

Enhance Our Resources To More Effectively Make A Difference We must ensure that funds are managed and used efficiently as well as find ways to expand our reach.

3: ENABLING SCIENCE

Continue sound investment strategies.

Nurture major endowment gifts whenever appropriate and possible.

Partner with other foundations, individuals and organizations.

"I resolved to stop accumulating and begin the infinitely more serious and difficult task of wise distribution."

Andrew Carnegie

Decreased federal funding for research has created an adverse impact on scientific exploration in America.

The sad truth is that despite the precipitous rise in federal research funding over the decades, and despite what by any other nation's standards would be considered a generous current allowance for public science programs, U.S. academic-based research funding effectively has stagnated during the last decade.

As former Republican Congressman John Edward Porter of Illinois, who now heads an organization called Research!America, put it this past spring:

"If you take the six major [funding] agencies together, you've seen increases at about half the rate of inflation in total, which means we have realized a substantial decrease in funding over the past five years."

Truly, money is exactly what drives the research process, as George Vande Woude and Erich Bloch so bluntly state. RCSA Board Member Brent Iverson, testifying before Congress last year, was among the first to point out to our national leadership that negligible increases in research funding, coupled with inflation, has meant a real contraction in research dollars. And this, in turn, has made American science more risk averse:

"Tight funding as we currently have now has the effect of making grant funding decisions overly conservative," Iverson told the Congress. "Right now, only about 10 percent of the grants in my research area receive money, so the panels must choose the 'can't miss, sure things' that represent the obvious next steps of research. It is not that the panels are overly conservative; it is just that no panel can reject these proposals because they will almost certainly lead to advances based on the strong scientific foundation upon which they are built. But what about new ideas that are not yet proven? In other words, the ideas that come out of nowhere, establish new paradigms and change the way we think? With such a limited number of grants supported, there is no money in the system for us to work on more speculative projects, ones closer to the leading edge of knowledge … Scientific breakthroughs rarely come from a research effort aimed at the 'can't miss obvious next steps.' In my experience, our breakthroughs have come when we least expected it, while we were exploring beyond the boundary of what we understood well."

Research Corporation for Science Advancement has, for sometime now, believed what the American Academy of Arts & Sciences stated in its recent report, namely that "today's early-career faculty will be responsible for our country's future science and technology discoveries and for the education of our future scientists and engineers. Yet this cadre of researchers faces greater obstacles than their more senior colleagues in securing research grants to inaugurate what should be one of the most productive stages of their careers."

At the National Institutes of Health, for example, for a young scientist to get her career off the ground, the chance of getting a grant is less than 4 percent. And "young" is defined as a person in her lower 40s. In other words, years pass from the time one accrues her Ph.D. until the time when she might be successful in getting federal support for the ideas she generates. The one "advantage" to this broken system is that it gives frustrated young researchers plenty of opportunity to decide on another career path and move in other directions. That's a national tragedy, the equivalent of eating our young.

"Nothing that was worthy in the past departs; no truth or goodness realized by man ever dies, or can die."
Thomas Carlyle

"You earn a reputation by doing hard things well."
Jeff Bezos, Amazon.com

Young scientists in the American academic community have traditionally composed the infrastructure upon which U.S. science gained its strength. The public funding of academic science in the United States has been a remarkable incubator for ideas that have spawned industries and boosted the economy in countless ways. Yet today, after an era of truly epic success, we're losing that advantage and we're losing the people who will spawn that next generation of ideas.

THE FOUNDATION RESPONDS

That's why, for the foreseeable future, Research Corporation for Science Advancement will focus more intensely on promoting opportunities for young scientists. Furthermore, we choose to define "young scientists" not by age, but by career stage – people who are in the first three or four years of their careers. RCSA has a deep and successful history of serving this cohort and now seeks to do so in an even more intentional fashion.

For this reason, and also because the foundation believes cross-boundary research is the future of U.S. science, it has not only created the Scialog® program, but has additionally taken steps to adapt its existing Cottrell College Science Awards (CCSA) program to better reflect America's evolving academic research needs.

Beginning in 2009 the CCSA program will have two different grant mechanisms. One will support individual, early-career researchers working in the physical sciences and on research projects that intersect other areas of science with the physical sciences at PUIs. The other will serve faculty at these same institutions by supporting interdisciplinary, collaborative research teams composed primarily of early-career scientists.

"These changes in our Cottrell College program are a direct response to modern science trends, and to the fact that departments are going through transformations and losing boundaries," says CCSA Program Officer Silvia Ronco. "Our hope is that our program will continue supporting the best physical science research at PUIs, while encouraging faculty and administrators to engage in interdisciplinary research activities."

Both the individual investigator and interdisciplinary CCSA sectors are focused at the small college, PUI, level because RCSA takes teaching seriously. PUI faculty also take teaching seriously, and it is our belief that quality teaching is best informed when faculty are engaged in exciting research. Therefore we have an explicit expectation that our PUI grant awardees will excel in the integration of teaching and research. As J. Michael Bishop noted in his 1989 Nobel Prize acceptance speech, "Scholarship and research without the vocation to teach are sterile."

RCSA's awards programs challenge young researchers to make a difference.

With this in mind, the foundation also is devoting more aggressive energies toward its other existing program, the Cottrell Scholar Awards (CSA). This program is targeted to young faculty (eligible in the third year of an initial tenure-track appointment) in the physical sciences, including biochemistry and biophysics, at Research I universities. The purpose of these awards is to challenge our very best young researchers to develop and evolve as educators.

The foundation is making an enhanced commitment to bringing its Cottrell scholars, past and future, together as a community – with a physical connection at annual meetings and a virtual connection through a web presence – to sustain these leaders of the future as they grow as scholars and educators who will make a difference at their institutions.

"Cottrell scholars show tremendous enthusiasm and energy which produces cutting-edge research and outstanding teaching," observes CSA Program Officer Richard Wiener. "Cottrell scholars from as far back as 1994, when the first awards were made, through the current crop of awardees attend the annual conference and engage in an ongoing dialog to improve the quality of science teaching in research universities. Their effort has a huge impact on reforming science education so that it's capable of meeting the global needs of a new century."

Thus Research Corporation for Science Advancement is moving into the 21st century addressing the nation's major science needs with what amounts to a four-tiered effort:

Tier One: The Cottrell College Science Awards single-researcher award is designed to allow young scientists, working individually at PUIs and small colleges, to grow as scholars in a way that will promote future scholarship and inform their teaching.

Tier Two: The CCSA interdisciplinary award is aimed at encouraging young scientists to work collaboratively on the edges of their knowledge on increasingly complex problems.

Tier Three: The Cottrell Scholar Award encourages young scientists, working at Research I institutions, to move their research forward and to evolve educational initiatives at the interface of teaching and research.

Tier Four: The Scialog® program is designed to empower multidisciplinary teams of researchers – early-career and mature – working with other multidisciplinary teams of researchers to address big questions in science in hopes of making a difference on a global scale and creating new communities of knowledge.

Raise the National Profile of Research Corporation
Position the foundation such that it is a more effective advocate for those people and causes it chooses to serve in the coming decade.

Demonstrate leadership from president and professional staff.

Conferences publications and position statements.

Centennial celebration in 2012.

Capitalize on program achievements.

Partner on new and/or current efforts.

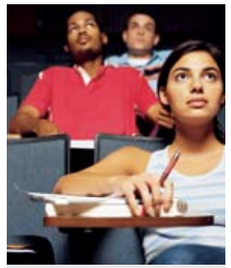
4: SUPPORTING SCIENCE

"I don't think you ever stop giving. I really do think it's an on-going process. And it's not just about being able to write a check. It's being able to touch somebody's life."

Oprah Winfrey

"Build your reputation by helping other people build theirs."

Anthony J. D'Angelo, Chief Visionary Officer of Collegiate EmPowerment



Training the next generation of young scientists will remain a focus of RCSA's programs.

SOMETHING TO OFFER

It is fitting that we do these things because, ultimately, Research Corporation for Science Advancement, like all foundations, is a service organization. It exists to advance those researchers and scholars who show great promise to enhance our scientific understanding and to train the next generation of young minds to carry this quest far beyond the current era.

As Larry Faulkner observes, however, American colleges and universities in some ways probably are not doing an adequate job preparing students to do research in the coming decades, given the increasing complexity of some of the questions we're facing. He adds, in words of wisdom we believe are applicable to all private and public funding agencies and others in the science community as well:

"It's also important to not give in to the notion that everybody ought to know everything. That's impossible. A student who is going to make an important contribution to an interdisciplinary world has to know something. They have to bring their knowledge, their talent, which is specialized, into a setting where the partnership works effectively. So the question is really not, 'Are they educated in every conceivable area?' The question is, 'Do they have something to offer, and have they developed in a way that makes them good players?'"

At Research Corporation for Science Advancement, we work every day to "have something to offer." It's our belief that the present challenges in academic research can be overcome, so long as we give some well-intentioned thought to our collective actions moving forward. We are all partners in the discovery process that is scientific research, and we must all work to promote the current crop of young scientists even as we focus on training the next generation. Smaller private foundations such as RCSA must remain alert to the patterns of scientific thought, must anticipate future needs in science, and must be nimble and courageous in creating patterns of success that can, with wisdom and patience, be emulated and adapted by larger public organizations.

Sincerely.

James M. Gentile
President and CEO

Funding

We are changing the way Research Corporation for Science Advancement funds the science of the future.

Recent program reviews have noted the trends driving our actions – increasingly productive research at the borders of established disciplines and the subsequent necessity of improving cross-disciplinary skills in the physical and biological sciences. These consistently growing trends have prompted RCSA to make a major change in its Cottrell College Science Award (CCSA) program, which provides critical research support for young faculty and their undergraduate coworkers at primarily undergraduate institutions (PUIs).

Program Review

Recent program reviews have noted the trends driving our actions – increasingly productive research at the borders of established disciplines and the subsequent necessity of improving cross-disciplinary skills in the physical and biological sciences. These consistently growing trends have prompted RCSA to make a major change in its Cottrell College Science Award (CCSA) program, which provides critical research support for young faculty and their undergraduate coworkers at primarily undergraduate institutions (PUIs).

While we will continue to fund the individual early-career researcher working in the physical sciences at PUIs, we also recognize that physical scientists are now engaged in research and teaching in many departments other than astronomy, chemistry and physics. Furthermore, we recognize that biologists, geologists, computer scientists and others are evolving solid research agendas on questions that are either embedded in, or intersect with, the physical sciences. Therefore we have broadened the scope of the CCSA program

Importantly, beginning in 2009 we will add an interdisciplinary component to the CCSA to promote faculty collaborations, within institutions, that address cutting-edge research questions. The expectation will be for faculty from different "departments" within an institution to collaborate on the research agenda as well as on how their research will impact what they teach.

The CCSA program will add an interdisciplinary component to promote faculty collaborations within institutions.

Regrettably, we are terminating the Research Opportunity Awards program. This action is based in part on the reality of flat federal funding in recent years and the resulting hardships faced by many academic researchers, but especially early-career scientists. As a small foundation we must remain highly focused; we recognize that we can do only so much in any given year. Thus, in our strategic planning sessions we deemed it vitally important to put the career establishment and advancement of early-career scientists as our priorities.

These changes, plus renewed emphasis on building strong and useful community ties among the winners of the prestigious Cottrell Scholar Award, will do much to channel traditional RCSA funding in new directions.

The result of our boldest decision, however, will not appear on the scene until 2009, when Scialog® makes its debut as an experiment in community building among the nation's top interdisciplinary researchers organized to tackle scientific challenges of global significance. Open to established researchers, as well as those just getting started, Scialog® will be RCSA's initiative to combine the advantages of collaborative research and funding with a focus on tightly defined, critical scientific questions by a nascent community of concerned scientists. It is our belief that those participants who demonstrate the ability to innovate, communicate and prosper in the Scialog® setting stand a good chance of advancing human knowledge and enterprise in the 21st century.

Raymond Kellman
Vice President

Program Review

Eighty-nine awards were made in support of faculty research and research-enhanced teaching in science in 2007. Funding for the foundation's programs, below, totaled $4,025,736.

COTTRELL COLLEGE SCIENCE AWARDS

Cottrell College Science Awards are the foundation's largest program, supporting faculty in chemistry, physics and astronomy at primarily undergraduate institutions. The number of applications in 2007 was 315, down slightly from the previous year's 15-year high of 345. The program, which encourages faculty research with undergraduate involvement, funded 75 of the 2007 applicants (24%). Two cycles of awards are featured each year; in 2007 the foundation granted a total of $2,825,736, averaging $37,676.

COTTRELL SCHOLAR AWARDS

Cottrell Scholar Awards support excellence in both research and teaching in chemistry, physics and astronomy at Ph.D.-granting institutions. Each award totals $100,000, to be used largely at the discretion of the scholar. Out of 130 requests submitted, 10 Cottrell Scholar Awards were made (7.7%), totaling $1 million.

RESEARCH OPPORTUNITY AWARDS

Research Opportunity Awards support mid-career faculty of demonstrated productivity who seek to explore new experimental research at Ph.D.-granting institutions. Out of 12 candidates nominated by their department chairs for awards in 2007, four proposals (33%) were funded, for a total of $200,000.

COTTRELL COLLEGE SCIENCE AWARDS

American University
Philip R. Johnson, Computer Science & Physics
Entangling ultracold atoms in an optical lattice: An array of coupled double-well beam splitter – $26,531

Amherst College
Karena A. McKinney, Department of Chemistry
Characterization of the emissions and oxidation products of terpenes at a New England forest – $40,110

Augsburg College
Benjamin L. Stottrup, Department of Physics
Transbilayer diffusion and mechanical properties of lipid bilayers containing sterol molecules – $30,019

Boise State University
Dmitri A. Tenne, Department of Physics
Ultraviolet Raman spectroscopy of ferroelectric and multiferroic nanostructures – $40,968

Boise State University
Byung I. Kim, Department of Physics
Scanning probe microscopy of interfacial water confined between silica surfaces – $36,683

California Polytechnic State University, San Luis Obispo
Karl Saunders, Department of Physics
Theoretical study of "de Vries" smectic liquid crystals – $33,220

California State University, Chico
Daniel D. Clark, Department of Chemistry
Proteomic and biochemical investigation of coenzyme-M biosynthesis in Nocardioides sp. strain JS614 – $46,318

California State University, Fullerton
Ionel Tifrea, Department of Physics
Nuclear magnetic resonance in low-dimensional semiconductor nanostructures – $43,684

California State University, Long Beach
Krzysztof Slowinski, Department of Chemistry & Biochemistry
Lateral charge transport in 2-D monolayers of polyaniline – $35,684

California State University, Long Beach
Stephen P. Mezyk, Department of Chemistry & Biochemistry
Elucidating the chemistry behind nitrosamine carcinogenesis: New redox- induced activation pathways for nitrosamines at physiological conditions – $35,197

California State University, Long Beach
Andreas Bill, Department of Astronomy
Coexistence of superconductivity and inhomogeneous ferromagnetism in multilayer structures –$26,684

California State University, Northridge
Jussi M. Eloranta, Department of Chemistry
Application of non-local bosonic density functional theory to model molecular-scale phenomena in superfluid 4He – $41,218

California State University, Northridge
Paula L. Fischhaber, Department of Chemistry & Biochemistry
The temporal role of ubiquitylation and sumoylation in nucleotide excision repair – $42,780

California State University, Sacramento
Thomas J Savage, Department of Chemistry
Elucidation of the biochemical pathway to the marine neurotoxin domoic acid – $27,856

California State University, San Bernardino
Susan M. Lederer, Department of Physics
High-velocity impact experiments: Investigating the effects of collisions on the surface properties of comets – $45,000

Carleton College
Melissa Eblen-Zayas, Department of Physics & Astronomy
Exploration of possible phase inhomogeneity in EuO thin films exhibiting a colossal magnetoresistive response – $22,911

Central Washington University
JoAnn Peters, Department of Chemistry
Imprinting silica gel surfaces through reversible covalent attachment of organic templates – $41,218

Cleveland State University
Petru Stefan Fodor, Department of Physics
Development and characterization of semiconductor – metal nanostructures fabricated through directed self-assembly – $43,584

Colgate University
Anthony R. Chianese, Department of Chemistry
Visor N-heterocyclic carbene ligands: An approach to secondary-sphere regulation of selectivity in homogeneous catalysis – $42,750

Colorado State University, Pueblo
Richard Anthony Farrer, Department of Chemistry
Direct fabrication of free-standing, three-dimensional metal microstructures via laser-induced deposition – $43,452

CUNY, Herbert H. Lehman College
Christopher C. Gerry, Department of Physics & Astronomy
Temporal and spatial resolution of fundamental processes in quantum field theory – $31,201

Davidson College
Cindy DeForest Hauser, Department of Chemistry
Heterogeneous chemistry of secondary organic aerosols and gas-phase oxidants – $39,454

Dickinson College
Lars Q. English, Department of Astronomy
Generation of lattice solitons via modulational instability in discrete electronic transmission lines – $29,226

Eastern Michigan University
Deborah L. Heyl-Clegg, Department of Chemistry
Development of insulin-based inhibitors for human islet amyloid polypeptide, a protein implicated in b-cell membrane destruction in type II diabetes – $44,456

Eastern Washington University
Jamie L. Manson, Department of Chemistry
Design, synthesis, and characterization of quasi-2D polymeric magnets – $42,662

Fairfield University
Min Xu, Department of Physics
Backscattering of partially coherent polarized light from a turbid medium – $39,218

Fort Lewis College
Monte L. Helm, Department of Chemistry
Phosphinomethylamines: A simple model of the hydrogenase active site for use in catalytic hydrogen production and oxidation – $33,648

Franklin and Marshall College
Scott Harmon Brewer, Department of Chemistry
Infrared investigation of short helical peptides with residue specificity – $44,766

Furman University
Brian Goess, Department of Chemistry
Development of homologated [2,3] and [3,3] sigmatropic rearrangements – $42,618

Gonzaga University
Stephen D. Warren, Department of Chemistry
Synthesis of lactate analogs as potential probes for the study of metabolic changes present in various pathophysiological conditions – $38,862

Hampshire College
Rayane F. Moreira, Department of Chemistry
Green chemistry with a superoxide dismutase mimic: Pirating a redox enzyme active site for Lewis acid catalysis – $34,909

Haverford College
Peter John Love, Department of Physics
Lattice gas models with dynamical geometry in two dimensions – $31,218

Hood College
Dana Lawrence, Department of Chemistry & Physics
Structural and thermodynamic characterization of the zinc-binding domain of zinc-finger antiviral protein – $39,000

Illinois State University
Q. Charles Su, Department of Physics
Light scattering in random media – $36,218

Illinois State University
Steven J. Peters, Department of Chemistry
Solution phase chemistry between the free radical nitric oxide and coenzyme-Q antioxidants – $41,554

James Madison University
Brian C. Utter, Department of Physics
The effect of imposed force fluctuations on the jamming transition in granular materials – $44,718

John Carroll University
Jeffrey S. Dyck, Department of Physics
Spin-carrier interactions in V2-VI3-based diluted magnetic semiconductors under high pressure – $30,234

Kenyon College
Frank C. Peiris, Department of Physics
Ellipsometric study of the evolution of band-structure of diluted magnetic semiconductors– $40,150

Loyola Marymount University
Jonas R. Mureika, Department of Physics
Exploring the texture and geometry of the universe: Lacunarity analysis of cosmological large-scale structure – $31,430

Marquette University
Andrew Kunz, Department of Physics
Simulation of domain wall injection and manipulation in magnetic nanowires – $29,464

Marshall University
Rudolf Burcl, Department of Chemistry
Theoretical study of atmospheric reactions involving the hydroxyl radical – $30,177

Miami University
S. Burcin Bayram, Department of Physics
Photoionization spectroscopy of highly excited cesium atoms – $37,539

Muhlenberg College
Keri L. Colabroy, Department of Chemistry
Lincomycin biosynthesis: The enzymology of propylhygric acid assembly – $37,942

Northeastern State University
Christopher M. Burba, Department of Natural Sciences
Confined electrolytes for low-temperature lithium rechargeable batteries – $44,674

Northern Kentucky University
Heather A. Bullen, Department of Chemistry
Probing the impact of siderophores in biofilm formation – $28,468

Regis University
James P. McEvoy, Department of Chemistry
Direct electrochemical investigations of photosystem II – $40,164

Rhodes College
Mauricio Cafiero, Department of Chemistry
The application of density functional theory and ab initio methods to aromatic protein/ligand binding – $36,914

Saint John's University
Gina Marie Florio, Department of Chemistry
Exploring nanoscale charge transport via single molecule conductance measurements – $28,292

Saint Joseph's University
Piotr Habdas, Department of Physics
Fluorescence microscopy studies of the re-entrant glass transition – $43,500

Seattle University
Peter J. Alaimo, Department of Chemistry
Enhancing diversity and improving stereoselectivity in the three-component synthesis of dihydropyridin-4-ones – $43,218

Skidmore College
Steven T. Frey, Department of Chemistry and Physics
Phototriggered linkage isomerization of immobilized ruthenium dimethylsulfoxide complexes – $44,990

Smith College
Nathanael A. Fortune, Department of Physics
Magnetic field-induced phase transitions in the 2D triangular antiferromagnet Cs2CuBr4 – $40,683

Southern Illinois University at Edwardsville
Chin-Chuan Wei, Department of Chemistry
Mechanism of calcium-induced electron transfer in NADPH oxidase 5 (NOX5) and dual oxidase (DUOX) – $44,948

SUNY at Binghamton
Oana Malis, Department of Physics
Intersubband transitions in lattice-matched nitride semiconductors for infrared light emission and detection – $44,244

Susquehanna University
Geneive E. Henry, Department of Chemistry
Chemical and biological investigation of hypericum species – $34,980

Texas A&M University at Commerce
Bao-An Li, Department of Physics
Constraining the possible time variation of Newton's universal gravitational constant G using the latest terrestrial nuclear laboratory data – $37,418

Trent University
Ralph Shiell, Department of Physics
The efficient production of heavy Rydberg systems using ultraviolet laser light – $20,500

University of Louisville
Xiaoping Tang, Department of Physics
A synergistic study of phase behavior, local dynamics and long-range transport of organic fluids confined in nanopores of functionalized nanotubes – $36,413

University of Missouri-Kansas City
Da-Ming Zhu, Department of Physics
Study microscopic conduction distributions and mechanisms in proton exchange membranes – $42,383

University of North Carolina at Charlotte
Thomas A. Schmedake, Department of Chemistry
Development of nanoscale optical materials – $35,300

University of North Carolina- Wilmington
Jeremy Bruce Morgan, Department of Chemistry & Biochemistry
Catalytic enantioselective cohalogenation of unactivated alkenes – $45,000

University of North Florida
Michael W. Lufaso, Department of Chemistry & Physics
Structure-composition-property relationships in complex Bi-Ni-Mn oxide phases – $42,911

University of Northern British Columbia
Andrea Gorrell, Department of Chemistry
mRNA turnover in arcaea: Purification and characterization of a putative RNase – $25,554

University of Richmond
Matthew L Trawick, Department of Physics
Nanometer-scale shearing and curvature-driven grain boundary migration in diblock copolymer thin films – $37,818

University of Richmond
Chiles Wade Downey, Department of Chemistry
A tandem enol silane formation-Mukaiyama aldol reaction: Controlling cationic silicon – $39,822

University of Saint Thomas
Anthony J. Borgerding, Department of Chemistry
Nitric oxide studies in brains of living animals using gas phase microdialysis sampling – $35,218

University of South Alabama
Albert A Gapud, Department of Physics
Effects of size and electronic structure of vortex cores on the dynamics of superconducting vortices – $43,800

University of Tennessee, Chattanooga
Gregory J. Grant, Department of Chemistry
Self-assembled platinum(II) and palladium(II) molecular square containing trithiacrown complexes as vertices – $35,218

Villanova University
Robert M. Giuliano, Department of Chemistry
Synthesis and structural characterization of functionalized graphite nanofibers: Materials for nanoscale applications in biology – $37,000

Western Washington University
Timothy Bryan Clark, Department of Chemistry
Asymmetric dearomatization reactions utilizing eta-2-Rhenium pi-bases: Use of benzylic Leaving groups for mild dearomatization – $44,651

Wilfrid Laurier University
Hind A. Al-Abadleh, Department of Chemistry
Surface interactions of organoarsenical compounds with model geosorbents: In-situ spectroscopic studies – $40,000

Wilfrid Laurier University
Stephen L. MacNeil, Department of Chemistry
Efficient helicene synthesis by tandem Bergman cyclization – intramolecular radical coupling/trapping – $31,806

Xavier University
Heidrun Schmitzer, Department of Physics
Micromanipulation and Microtools: Investigating self-regulating optically active elements and naturally grown, optically driven rotors – $44,995

COTTRELL SCHOLAR AWARDS

City University of New York, City College
Dr. Carlos Andres Meriles: Generation and control of nuclear spin magnetization in semiconductor nanostructures – $100,000

City University of New York, Hunter College
Dr. Neepa T. Maitra: Strong-field dynamics of atoms and molecules in time-dependent density functional theory: A phase space exploration – $100,000

North Carolina State University
Dr. Alexander Deiters: A library approach to cellular light receptors – $100,000

Simon Fraser University
Dr. Nancy Forde: New directions in biological physics at Simon Fraser University: From single-molecule research to the teaching laboratory – $100,000

University of Illinois at Urbana-Champaign
Dr. Benjamin J. McCall: Research and teaching in astrochemistry: Carbocation spectroscopy and a novel laboratory course – $100,000

University of Michigan, Ann Arbor
Dr. Mary Elaine Putman: Mapping the galaxy's gaseous halo – $100,000

University of Texas at Austin
Dr. Christopher W. Bielawski: Dynamic polymers as recyclable catalysts: An integrated teaching, mentoring and research program in macromolecular chemistry – $100,000

University of Utah
Dr. Jordan Mitchell Gerton: Toward nanoscale microscopy and manipulation of functional biomolecular networks – $100,000

University of Wisconsin, Madison
Dr. Song Jin: Nanoscale magnetic semiconductor materials for spintronics – $100,000

Virginia Polytechnic Institute and State University
Dr. Diego Troya: Making progress toward the theoretical description of the dynamics of gas-organic surface chemical reactions – $100,000

RESEARCH OPPORTUNITY AWARDS

Brigham Young University
Dr. Merrit B. Andrus, Department of Chemistry & Biochemistry
Phase-transfer catalyzed acyl-imidazole reactions – $50,000

Georgia State University
Dr. Dabney White Dixon, Department of Chemistry
Heme uptake via ABC transporters – $50,000

University of North Carolina at Chapel Hill
Dr. Gerald Cecil, Department of Physics & Astronomy
Fast outflow & ionization cone dynamics from galaxy nuclei, studied with visible-light spectral maps & laser-guided adaptive optics – $50,000

Western Michigan University
Dr. John A. Tanis, Department of Physics
Guiding of fast electrons and positive ions in nanocapillaries – $50,000

Financials

Research Corporation for Science Advancement's condensed statements of activities and changes in net assets for the years ended December 31, 2007 and 2006 are presented in this section.

The foundation's audited financial statements for 2007 and 2006 can be viewed online at www.rescorp.org.

CONDENSED STATEMENTS OF ACTIVITIES AND CHANGES IN NET ASSETS
YEARS ENDED DECEMBER 31, 2007 AND 2006

REVENUES	**2007**	**2006**
Investment Income, Net	$ 16,788,690	$ 21,887,395
Other Income	253,275	358,968
Total Revenues	**17,041,965**	**22,246,363**
EXPENSES		
Grants Approved	3,748,887	6,046,101
Program-Related	300,000	4,800,000
Science Advancement	1,430,039	1,490,040
Information and Communications	361,768	185,982
General and Administrative	1,387,100	1,367,823
Other	958,147	313,128
Rescinded Award	(2,100,000)	–
Total Expenses	**6,085,941**	**14,203,074**
INCREASE IN NET ASSETS	10,956,024	8,043,289
NET ASSETS – Start of the Year	156,553,440	148,510,151
NET ASSETS – End of the Year	$ 167,509,464	$ 156,553,440

CONDENSED STATEMENTS OF FINANCIAL POSITION
DECEMBER 31, 2007 and 2006

ASSETS	**2007**	**2006**
INVESTMENTS	**$ 171,379,587**	**$ 164,980,907**
Cash and Cash Equivalents	3,031,977	
Notes and Other Receivables	1,408,925	2,960,056
Interest in LLC	1,820,439	1,878,277
Prepaid Pension Cost	196,639	629,825
Other	617,860	922,368
Total	**$ 178,455,427**	**$ 171,371,433**
LIABILITIES AND NET ASSETS		
LIABILITIES		
Grants Payable	$ 3,600,476	$ 5,160,538
Line of Credit	4,000,000	2,285,851
Notes Payable	–	1,213,611
LSST Liability	275,000	2,732,000
LBT Liability	1,598,194	1,801,912
Other	1,472,293	1,624,081
Total Liabilities	**10,945,963**	**14,817,993**
UNRESTRICTED NET ASSET	167,509,464	156,553,440
Total	**$ 178,455,427**	**$ 171,371,433**

Raymond Kellman,
Vice President

Dr. Ray Kellman Retires

Research Corporation for Science Advancement announces the retirement of Dr. Ray Kellman, Vice President, as of July 1, 2008. Ray began his career at the foundation in 1992 and assumed the vice presidency in 2002. As a program officer and as an administrator he's made hundreds of visits to the nation's college campuses during the past decade and a half and has spoken to countless researchers, administrators and students. RCSA values Ray's insights and doubtless will continue to draw on his wisdom and professional talents in the years ahead.

What follows are excerpts from a recent interview in which Dr. Kellman was asked to reflect on the foundation and the community it serves:

Q. In the 15-plus years you've worked for Research Corporation, how has the world of academic research changed?

At Primarily Undergraduate Institutions (PUIs) there are now far more resources available to faculty who want to do research. A lot of credit goes to the foundations for this; for years they have been carrying the message to the campuses that they needed to do a lot more in the way of providing resources, and now I think they do – almost to a fault, in some cases.

Nowadays it's very unusual to go to a campus and find a pervasive attitude that research will not be supported at all, but 20 to 25 years ago that was the norm. When I started my academic career, you were practically forbidden to do research at many PUIs; now the attitude is precisely the opposite. If I were holding a faculty position at a PUI today, I'd have opportunities with the NSF, NIH, Research Corporation, with Dreyfus, ACS, PRF and a lot of others. Furthermore, significant start-up money and money for undergraduate stipends is available at most of the colleges that have gotten the message about the importance of research.

Scientific research is the best education an undergraduate will ever have. It used to be that people who graduated with a degree in one of the sciences knew *about* science. Today those graduates who are involved with productive research and obtain a degree leave their alma maters *as* scientists. They are intellectually equipped to be practitioners of science.

Q. So the situation has really improved?

At the PUIs it has improved remarkably; and – in my view – there is simply no excuse for faculty, given those kinds of resources, not to be productive in research.

Q. In your many campus visits, what kind of attitudes have you seen that allow one campus to have productive researchers while another one doesn't?

You need a driver in any given department – someone who simply must do research, someone who has "the fire in the belly," as is so often said. If an institution doesn't have a reputation for research, and they want to develop, there has to be one or two driven people who are willing to push this. In addition you must have an administration that's open to the idea of doing research and that is supportive. And in my 15 years I've seen that happen a lot. Where it does not and can not flourish is in situations where you have faculty who really don't want to do research, a faculty without a driver, and an administration that is indifferent or doesn't see the value in research as a scholarly pursuit for faculty and students.

Q. Have you noticed any broad changes in students over the years?

Science has become more available as an option. It used to be students who came from affluent families and who went to superior high schools wound up in the sciences, and kids who didn't quite have those opportunities weren't seen in the sciences. But now that's changed, due largely to economic changes which offer opportunity to a larger segment of the population. This is particularly obvious at the large, comprehensive public universities. In the Cal State system, for example, you've got a lot of kids from pretty ordinary backgrounds, some of them are absolutely brilliant, and they're now given a great opportunity. They're not going to Amherst or Occidental, they're going to San Jose State, Cal State L.A. and to Cal State Long Beach or perhaps to UT Arlington, or UTEP. There's simply much more opportunity now for those kids. And keep in mind that these institutions offer opportunities in science to very significant numbers of students from all kinds of underrepresented groups.

Q. So we've succeeded to a great extent in democratizing science?

Yes. There's that pool of talent that we're tapping now that we never tapped in the past. Of course there are never enough minorities going into science, that's always been a given, but today there are many more women. It's just a matter of time before we reach a point of equilibrium on the balance of men and women in the sciences. I don't know that it has to be precisely 50/50, but currently 30-35 percent of the proposals we get are from women, and when I started it might have been 10 percent from women. Certainly the PUIs are attracting more women than the research universities. The Research I university is a rough environment, even hostile to some, that a lot of women – and increasingly some men – still say no to. Someone ought to pay far more attention to why they're saying no.

Q. How do you view the funding situation at the Research I universities today?

If someone grabbed me by the throat and put me up against the wall and said look, you're going to put all of your money in one basket, where do you want it? I'm going to say I'm sorry folks, but it's the R1s and the young researchers there who get my money. Because, generally speaking, the resources for early-career scientists are available at the PUIs, but there are more problems for young people at the R1s, where it's always been tough, but it's particularly tough now. The funding they have is tenuous, and that makes young scientists with bright ideas risk averse. They're much less willing to take risks because there's too much at stake: If they lose funding they won't be able to get it again, they won't be tenured, and they won't be promoted. The R1s are driven by money far too much now, and I don't see that changing anytime soon.

Q. In your opinion, does Research Corporation have any unique attributes among small science foundations?

The policy of going out into the field and visiting campuses and seeing what's going on in the trenches is unique to Research Corporation. Nobody does that to the level that we do it, and it certainly put us in a better position to spend our money wisely. There's nothing wrong with going after people with great pedigrees. It's a safe bet, and you're going to win a lot of the time. But you're likely to miss that person who could just blow open a new area in research.

And just let me say, I believe Research Corporation has the strongest program officers in the nation. They've all had solid to outstanding research programs of their own, and that's not just the present group, but historically. And when they go out they give the proper advice, they really help people develop research careers. We hear this all the time (from the community).

Q. RCSA program officers are on the road at least once a month, if not more. Has that been a hardship for you?

One of the great advantages of the visits is that they're not a drag. They're rejuvenating. That's because we go out and we talk to people at the front lines who are doing the best science. We're talking to people on the cutting edge of science and science education. And when you're exposed to these people you can't help but come back rejuvenated. I would go out and do a week of visits and return exhausted from that, but at the same time you're energized and rejuvenated. You can't wait to get back to the office to tell folks what you've seen, what you've found, and that we ought to take a chance on a school or individual you've just visited.

Q. If you were orienting the foundation's future program officers, what would you say to them?

Focus on the young people, take risks, and get out in the field – talk to people.

Q. Do you have any immediate plans for your retirement?

My wife, Kate, and I are birders. Almost immediately we're going up into the extreme northwest part of Argentina, where nobody else much goes, up in the mountains on the southern end of the Amazon Basin. When we go on these birding trips, they're not relaxing vacations, they're very intense. There's a skill in finding things. There's a real skill in looking at plumage and behavior and in observing the sounds and making the right identification. And as you get competitive you keep lists. A friend, Ed, who got me interested in birding years ago, has probably seen and identified at the 5,000 to 6,000-bird level, out of 8,000-plus birds worldwide. I'm way back at about 2,500 to 3,000 species seen – a mere novice.

Birding gets you to some interesting places where most tourists will never go. When we go to the UK, for example, we do the London thing and all the culture and history, but then we wind up in some flea-bitten marsh, or at a sewer pond. Birding is an outdoor activity that I like that has both intellectual and competitive components to it, but it's just one of several things I'll be doing to stay out of trouble – remember, I'm not reading and evaluating proposals any more!

RESEARCH CORPORATION
for SCIENCE ADVANCEMENT

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