

2006-2007 YEAR BOOK

# The President's Report

*July 1, 2006 - June 30, 2007*

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*“ . . . to encourage, in the broadest and most liberal manner, investigation, research, and discovery, and the application of knowledge to the improvement of mankind . . . ”*

The Carnegie Institution of Washington was incorporated with these words in 1902 by its founder, Andrew Carnegie. Since then, the institution has remained true to its mission. At six research departments across the country, the scientific staff and a constantly changing roster of students, postdoctoral fellows, and visiting investigators tackle fundamental questions on the frontiers of biology, earth sciences, and astronomy.

# Carnegie Institution

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# The President's Commentary

*Preparing for the Future*





Carnegie president  
Richard A. Meserve  
*(Image courtesy Jim Johnson.)*

**A**ndrew Carnegie's goal in establishing the institution was to advance scientific understanding by finding exceptional scientists and providing them with the means to pursue highly original work. This formula has proven highly successful; in each of our departments, we are accomplishing remarkable cutting-edge research. This reality is demonstrated by the coin of the scientific realm—the large number of articles published by our staff in prestigious peer-reviewed journals (see pages 72-87). It is also demonstrated by the recognition achieved by our scientists in the last decade—a Nobel Prize, three Balzan Prizes, a Lasker Prize, three Gruber Prizes, a Louisa Gross Horwitz Prize, the Lehmann Medal, the Dana Medal, and many others.

To prepare for the future, we should build on our demonstrated success and pursue a cluster of complementary goals:

### **Maintain the diversity of Carnegie science across our existing departments.**

Carnegie supports a diverse range of scientific disciplines. All of our departments are vital and, I believe, have had impacts on scientific knowledge that are disproportionate to their sizes. This perspective is reinforced by my interactions with outside scientists and by the periodic, careful departmental reviews that are undertaken by visiting committees. As a result, each department deserves continuing support. We should not shift substantial resources away from one to grow or benefit another.

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### **Retain departmental flexibility to define and pursue scientific opportunities.**

The scientific opportunities in given fields wax and wane over time. Carnegie has managed this reality by allowing the focus in each department to evolve. Perhaps the Department of Terrestrial Magnetism (DTM) provides the clearest example. Although it once investigated the subject indicated by its name, no serious work in that field has occurred for almost 80 years. The fundamental Carnegie guidance to allow substantial freedom to individual scientists to pursue research that promises significant advances has resulted in significant shifts in focus over time.

The preservation of this capacity to adapt implies a strategy of seeking, in the main, to avoid top-down direction of scientific activities. Rather, the institution should respond to the special opportunities for significant advances that are identified by individual scientists or departments. Because of the need to preserve core support of all departments, the financial capacity for change arises chiefly from funds that are redirected within individual departments, that are available at the margin, or that arise from support from government agencies, foundations, or individuals. Changes in departmental direction also arise through the appointment of new scientific staff, and the department directors play a critical role in these decisions.

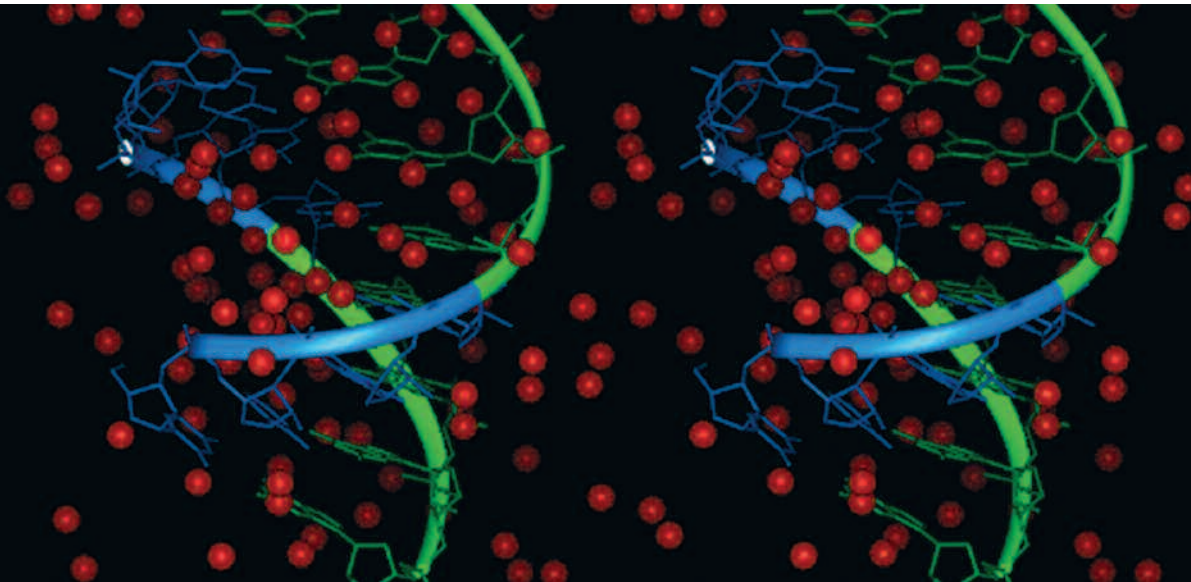
### **Provide an exceptional research environment.**

Attracting exceptional people to our scientific staff and providing an environment in which their research can flourish involves several components:

- Provide our scientists with freedom to define their own research agenda, and strive to minimize barriers that inhibit productive research.
- Ensure competitive salaries for both scientific staff and specialized support staff.
- Maintain the vibrancy of the research environment with high-quality postdocs. Postdocs are a means to propagate Carnegie's special skills to the scientific world and to strengthen the connectivity of our staff to the broader scientific community.
- Ensure that equipment and instrumentation needs are met. The ordinary budget process, guided by priorities established by the department directors, has in the past limited equipment support too severely. We are now analyzing equipment requests, with the target of allocating 6-8% of our budget for equipment.



Joe Gall at the Department of Embryology has been awarded numerous prizes over the years. The Lasker Foundation awarded him the prestigious 2006 Lasker Medical Research Award for Special Achievement in Medical Science as "a founder of modern cell biology who has made seminal contributions to the field of chromosome structure and function, who invented *in situ* hybridization, and who has been a long-standing champion of women in science." Gall was also chosen to receive the 2007 Louisa Gross Horwitz Prize, awarded annually by Columbia University to recognize outstanding contributions to basic research in the fields of biology and biochemistry. Gall shares the 2007 award with Elizabeth H. Blackburn of the University of California, San Francisco, and Carol W. Greider of the Johns Hopkins School of Medicine.



Carnegie and the University of Massachusetts hold the patent to RNA interference (RNAi). RNAi is a powerful tool in which double-stranded RNA suppresses the activity of specific genes. It was discovered by Andrew Z. Fire while he was at Carnegie's Department of Embryology and Craig Mello of the University of Massachusetts Medical School. They shared the 2006 Nobel Prize in Physiology or Medicine for this discovery. RNAi is used to conduct research and to develop products to combat diseases such as cancer and HIV.

*(Image courtesy IMB Jena Library of Biological Macromolecules.)*

### Preserve and enhance the institution's financial base.

The Carnegie endowment enables the fulfillment of our mission: it allows our scientists to pursue more risky, more novel, or more long-range research than can typically be supported with outside funding. Fortunately, as a result of the considerable skills of our Finance committee and the generosity of our donors, we have been highly successful in the management of the endowment. It is now \$450 million larger than if we had simply kept pace with inflation over the past 15 years. Careful efforts to invest the endowment prudently to maximize return consistent with reasonable risk have been and must remain a continuing high priority.

We must balance the use of the endowment to satisfy current needs against the obligation to meet the needs of future scientists. The fundamental discipline for achieving this balance is careful adherence to our spending rule.<sup>1</sup> This discipline should be maintained, while recognizing that a special need may occasionally arise that justifies an expenditure in excess of that allowed by the spending rule.

To stretch our endowment dollars, it is appropriate for Carnegie scientists to seek outside funds (federal and private) to support our research. Because of the

<sup>1</sup>The spending rule provides for the allocation of funds from the endowment to meet current needs that is defined as the sum of 70% of our most recent budget and 1.5% (5% of 30%) of the value of the endowment at the end of the most recent fiscal year, less an allowance for debt obligations. The allocation is examined on a yearly basis by the Budget and Operations committee.

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varying availability in funding across scientific fields, there are differences in the proportion of each department's budget that arises from outside funding. For example, our optical astronomers are typically less well supported from federal dollars than are our plant biologists. Hence we must accept the reality that some departments may be more dependent on the endowment than others.

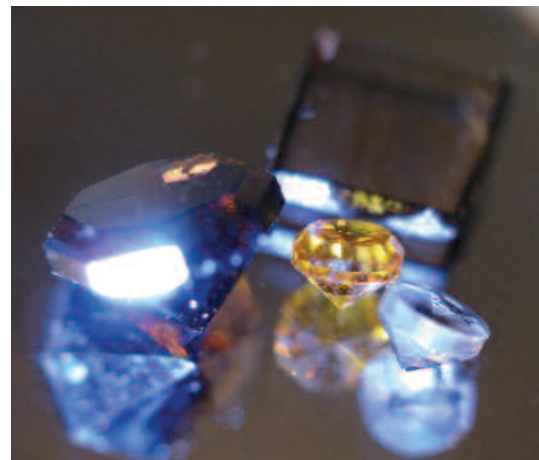
In this connection, it is important to ensure that reliance on outside funds does not distort the work that is undertaken. That is, outside support should be sought solely because of the intrinsic merit of the scientific work, not simply to obtain additional money. The department directors play an important role in ensuring that outside funding facilitates worthwhile scientific work consistent with our mission.

The enhancement of the institution's financial capacity requires modernization of our development activities. Carnegie faces certain challenges in this regard because, unlike a university, we do not have a natural constituency—an alumni body—that can serve as the base for fund-raising. Moreover, Carnegie's purpose—to advance basic science—may not have the widespread appeal that solving a pressing societal problem or curing a human disease may present. Carnegie-type science will yield paradigm-shifting advances that can open whole new means for addressing human problems, but such gains cannot be promised in connection with individual projects. Hence our appeal must be to a unique constituency with the means to provide significant support and the vision to value our work.

Carnegie has been effective in recent years in approaching foundations that support basic science. We now are also building a development capacity to establish enduring relationships with a broad group of individuals. This work has involved assembling a professional staff to provide the underpinnings for a comprehensive outreach effort and installing administrative systems to undertake broad appeals successfully. Such outside support can help us to pursue high-priority projects or to enhance the capacity of the endowment to provide enduring financial support.

Similarly, although the purpose of Carnegie science is not to achieve commercial gains, we do obtain patents on commercially promising intellectual property developed by our scientists. We are pursuing a prudent and careful approach in licensing our technology to enhance these revenues. Over the past few years, the annual revenues from patents have grown from \$1.8 million to \$2.3 million.<sup>2</sup>

<sup>2</sup>Major opportunities are being pursued in connection with our RNAi patent (approximately 50 licensees) and our synthetic diamond patent estate, with additional possibilities arising from certain recent work at Plant Biology (FRET technology).



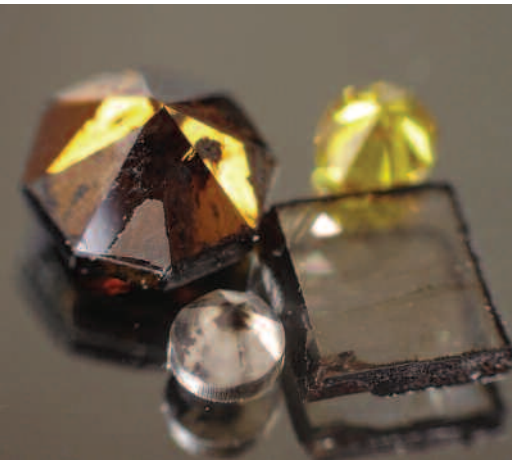
The diamond-making team at the Geophysical Laboratory developed a chemical vapor deposition process to produce large, superhard diamonds very quickly. The crystals are important in high-pressure research; they are used to create extreme pressures.

(Image courtesy Russell Hemley.)

Pursuing the various goals described here will require more resources than reasonably can be expected from our endowment. Nonetheless, I believe that the various means to supplement endowment support should enable us to achieve our goals.

### Recognize special opportunities.

Carnegie must ensure a continuing capacity to respond to special opportunities or needs that have the potential to lead to major scientific breakthroughs or that are essential to the future of a department or the institution. Several examples are now before us:



- We live in a time of enormous scientific change arising from the convergence of astronomy, cosmology, and high-energy physics. Our astronomers view the proposed Giant Magellan Telescope (GMT) as an instrument that will allow examination of some of the fundamental mysteries of the universe. Significant efforts have been underway over several years to realize this opportunity without undue strain on Carnegie's financial capacity.
- The Global Ecology department has been remarkably successful in its first years in advancing the science of climate change, providing the foundation for the development of policy, and enhancing public awareness of the importance of this issue. There is a need to expand the activities of this department significantly, and a focused campaign to "grow" the department is being launched.
- Many of our scientists depend on advanced computational resources. For example, scientists at Global Ecology use computer clusters to run complex global circulation models and analyze large data sets from remote sensing instruments; scientists at Plant Biology maintain a massive database of genetic information on *Arabidopsis* (a mustard plant that is a model organism for plant biologists), serving scientists around the globe; researchers at DTM run complicated computer models to understand the formation of planets; and investigators at the Geophysical Laboratory use sophisticated computers to model phenomena in materials under extreme conditions (pressure and temperature). The infrastructure to support these computing needs requires refurbishment.

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### **Make focused contributions to science education.**

The District of Columbia confronts huge problems in its schools, with the result that many of the city's children are denied the opportunities that only a proper education can provide. In recognition of this need, Carnegie has contributed to its community by enhancing science education through the Carnegie Academy for Science Education (CASE). This program has been entrepreneurial in seeking support. Our Washington-based education staff is also working with colleagues in Baltimore to build a counterpart capability there. Our astronomers in Pasadena have established a mentorship program with nearby Pomona College. And now CASE is involved with some of our large federally funded projects because education and public outreach are now required components of proposals at most federal agencies.

### **Strengthen administrative operations.**

With the involvement of several board members, we undertook a detailed evaluation of our business and administration systems, which resulted in sweeping recommendations for change and modernization. As part of this effort, Carnegie is installing new accounting and administrative software that will be operational by July 2008. Moreover, the business staff at headquarters has been significantly upgraded by new hires. This overall effort is very important and has had the benefit of continuing oversight by the Audit committee.

### **Increase the visibility of the Carnegie Institution.<sup>3</sup>**

The Carnegie Institution has been remarkably successful in advancing scientific knowledge, but is largely unknown outside the particular scientific communities in which we work. We are often confused with other Carnegie enterprises. Our name provides no indication of what we do, and the "of Washington" modifier is fundamentally confusing because four of our six departments are elsewhere. To improve our visibility, we are promoting a new logo—Carnegie Institution for Science—and have created a new and attractive website (see [www.ciw.edu/](http://www.ciw.edu/)). We are issuing frequent press releases in an effort to enhance public awareness of important advances by Carnegie scientists. Our Capital Science lectures often fill our auditorium at headquarters, and we now are planning periodic symposia in New York City and California. To reach out to local communities, the Observatories staff is sponsoring



The Department of Global Ecology's new building proclaims the department's mission of promoting a sustainable future. It was named one of the American Institute of Architects' top ten green buildings for 2007. The structure is located on the Stanford University campus and was designed by EHDD.

*(Image courtesy Peter Aaron/Esto Photographics.)*

<sup>3</sup>This goal bears on our efforts to enhance development as well as to recruit top-notch staff and postdocs.

*Carnegie Institution of Washington*

a lecture series at the nearby Huntington Library, and the Broad Branch Road departments have launched a lecture series at the handsome new auditorium in the Greenwalt Building. We believe that these activities help to create an understanding that reinforces the institution's reputation to which our scientific work entitles us.

**Plan to refurbish facilities.**

Some of our buildings are growing old, and renovations are needed. We have successfully

completed new building projects for Embryology and Global Ecology, and we have renovated our P Street headquarters, the Observatories' building in Pasadena, and the Greenwalt Building at Broad Branch Road in recent years. Nonetheless, some of our other facilities need refurbishment, including other buildings at Broad Branch Road and at Plant Biology. Although funds are allocated each year for maintenance and upgrade of our buildings, further efforts will be required over the next decade to improve our aging properties.

**Consider governance changes.**

The Carnegie board plays a critical role in helping to chart the course of the institution. It is healthy to examine the effectiveness of our governance processes from time to time and to make changes as appropriate. This is a challenge that our board is confronting.

These goals provide the institution with an aggressive agenda for the coming years. The board and I believe that they build on our strengths and achievements and provide the foundation for significant scientific advances in the decades to come.



*Richard A. Meserve*



The 80,000-square-foot Maxine F. Singer Building, which houses the Department of Embryology, has 13 modern labs and striking shared spaces. It was designed by Zimmer Gunsul Frasca Partnership and built on the Johns Hopkins campus in Baltimore.

*(Images courtesy Zimmer Gunsul Frasca Partnership.)*