

# The Inauguration of David Baltimore

by Maxine F. Singer

*David Baltimore was inaugurated as Caltech's sixth president on March 9, 1998, a warm, sunny day unthreatened by El Niño. Beckman Mall (aka the Court of Man), festively decorated for the occasion, hosted an audience of friends, students, staff—and the faculty, who, also festively decorated, processed through the crowd to a march played by the Convocations Brass and Percussion Ensemble.*

*Baltimore was welcomed to the Institute in brief remarks by Maria Throop Smith, great-granddaughter of Caltech founder Amos Throop; by Faculty Chair David Stevenson, the Van Osdol Professor of Planetary Science; by Kohl Gill for the undergraduates and Geneviève Sauv  for the graduate students; by Thomas Tyson, '54, PhD '67, president of the Alumni Association; and by Caltech presidents emeriti Marvin Goldberger and Thomas Everhart. The Caltech Glee Clubs performed an arrangement by Robert A. M. Ross, '98 of the traditional college song "Gaudeamus Igitur" before Baltimore was invested as president by Gordon Moore, chair of the Board of Trustees. Kip Thorne, the Feynman Professor of Theoretical Physics and chair of the search committee that chose Baltimore, introduced the new president, who then delivered his inaugural address (see the current issue of Caltech News).*

*Before the actual investiture, Maxine Singer, president of the Carnegie Institution of Washington, who had been chosen to be the "invited speaker," also spoke to the inaugural audience. Her remarks follow.*

Good afternoon Gordon Moore, members of the Caltech Board of Trustees, David Baltimore, Alice Huang, Teak Baltimore, and all of you gathered here. I am honored by your invitation to speak to the Caltech community on this extraordinary day.

It is especially wonderful to tell all of you, on behalf of David's family, friends, and longtime colleagues, of our pride and pleasure as we join you to celebrate the gifts that he brings to this

university. His are the kinds of talents that have allowed individuals to shape and sustain institutions and, through them, our society.

Caltech would not collapse if it had no president; most of you would keep right on doing the things that make this place a source of new knowledge and talent. And, in fact, these days the chief executives of many important American institutions—universities, corporations, and foundations—are faceless and nameless, inner-directed caretakers and fixers. They turn outward not to provide leadership, but to pursue special interests. Theirs is a meager success.

But universities should do more than just carry on; they should give shape to the evolution of our society. Such a *grand* success depends on bold leadership by exceptional people who can recognize and define the changing currents. The stewardship of a great private university bestows an environment for the exercise of such leadership. And that is why the inauguration of a new president at a place like Caltech is an event of national, even international, consequence.

Your own institution took shape from the mind of one great scientist, George Ellery Hale. Unlike many other private institutions, Caltech's roots lie not in some religious or philanthropic motivation or, as has happened in recent times, the nature of the tax laws, but in Hale's imagination. He envisaged, in a place then far removed from the intellectual center of the nation, an institution where science and the education of young scientists would flourish.

Hale came to Pasadena from Chicago 95 years ago to establish, on behalf of the Carnegie Institution of Washington, my institution, an astronomical observatory on Mount Wilson. By the time he was 33 years of age, his research had revealed so much new about the sun (and thus other stars) that he had already been elected to the National Academy of Sciences. He found here a town scarcely begun. A horse-drawn bus took him

**Left: Before the ceremony, Maxine Singer and David Baltimore bring up the rear of the academic procession to the podium.**



In 1909 Andrew Carnegie (left) visited George Ellery Hale at Mount Wilson's 60-inch telescope, which Hale's imagination and Carnegie's money had built. And when Hale wanted an even bigger telescope, with a 100-inch mirror, Carnegie helped fund that too.



"Murph" Goldberger (left), Caltech's president from 1978 to 1987, and Tom Everhart, who succeeded him from 1987 to 1997, joined in welcoming the newest president.

through muddy, unpaved streets to the start of the burro trail that led to the peak of Mount Wilson.

There he built solar telescopes and the huge 60-inch and 100-inch reflectors, the largest in the world, and Carnegie astronomers changed forever our view of the universe. "Never do a small thing when you can carry out a big one," Hale said (quoted in Helen Wright's book *Explorer of the Universe*). And Hale's definition of "big" kept on getting bigger and bigger. Eventually he dreamt of a 200-inch telescope, and though he didn't live to see it, he died knowing it would one day gather light on Palomar Mountain.

The universe itself was insufficient challenge for Hale's tumultuous brain. Undaunted by the distance between Pasadena and the East, he became a driving force for the modernization of the National Academy of Sciences and the establishment of the National Research Council Fellowships, which were to a large extent responsible for the growth of American science between the two world wars. He set the precedent for the unceasing travels of contemporary academics and *he* did it by train.

At home, Hale imagined Pasadena as a civilizing center for education, the arts, and the good life. As early as 1906 he began scheming to convince Henry E. Huntington to establish with his collections, not just a museum, but a research library, in Pasadena. It took more than 20 years, but just a few months before Huntington's death in 1927, Hale succeeded.

Foremost among Hale's dreams for Pasadena was the metamorphosis of the small, provincial Throop

Polytechnic Institute, of which he was a trustee, into this great California Institute of Technology. So much of what the Institute is was set down by Hale's boundless enthusiasms, his persistence, his scheming, his skill at inspiring national foundations and wealthy local citizens with his plans, and his unyielding tactics with the great scientists he convinced to come to Pasadena. It is a source of great pride to my own institution that its support of Hale and his plans made much of this possible. The common roots of Caltech and the Carnegie Observatories here in Pasadena remain a strong mutual tie.

David Baltimore was born on March 7 (happy birthday, David), exactly two weeks after Hale passed away, in 1938. Together their lives span the astounding scientific years from the last decades of the 19th century to the present. And like Hale, David contributed in seminal ways to these scientific revolutions and to the place of science in our society.

In 1970, only 10 years after he had received a bachelor's degree, David made a discovery that toppled longstanding assumptions about the flow of biological information. Simultaneously with another biologist, Howard Temin, a Caltech PhD, he demonstrated a mechanism for copying RNA molecules into DNA. At the time, this startling reverse flow of genetic information appeared to be restricted to a certain kind of virus. But in the intervening years, the significance of the discovery was magnified many times over. The enzyme they described became a central tool of contemporary molecular biology, as basic as telescopes are to astronomy. We now know that similar enzymes are encoded in the genomes of most if not all living organisms, not just those of certain viruses. And, most surprisingly, we have recently learned that one essential process, the construction of the ends of new DNA molecules, actually depends on the kind of enzyme that they discovered almost 30 years ago.

David recognizes, as did Hale, that great scientific accomplishment privileges a broad scope, an opportunity, even an obligation, to champion the place of science in the larger society. But the contemporary challenges to the exercise of that privilege would surprise Hale and frustrate him.

In Hale's day, the larger society almost universally viewed science with awe and great expectation. Today, the awe and expectation are tarnished for significant segments of the public for reasons both understandable and inexplicable. How then can the obligation to champion the place of science in society be exercised?

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A. Bartlett Giamatti, a nonscientist who was president of Yale and a uniquely eloquent spokesman for universities, gave an answer to this question when he said (in *The University and the Public Interest*, 1981): "From the scientists . . . we learn what we should never forget, that to view nature justly, nature human and material, we must eschew parochialism and casual labels and bureaucratic boundaries, and seek to see the truth from as many vantage points as humankind can summon."

That is a wonderful vision, but Giamatti was not naive. He knew well enough from his own faculty that parochialism, casual labels, and bureaucratic boundaries are alive and well in academic institutions. To be credible champions for science, then, requires that the university's own house be in order.

Boundaries between disciplines are even less pertinent today than they were when David learned, as an undergraduate, about the tensions between chemists and biologists. Now we are at a point where traditional disciplines define methodologies, not innovative scientific questions, the questions that inspire both scientists and the public. Consider, for example, the relation between physics and cosmology. Or between chemistry, biology, and earth science. Some on this campus are already working to bridge these boundaries. But parochial ideas are still afloat. I have even heard some people express surprise that a biologist is Caltech's new president.

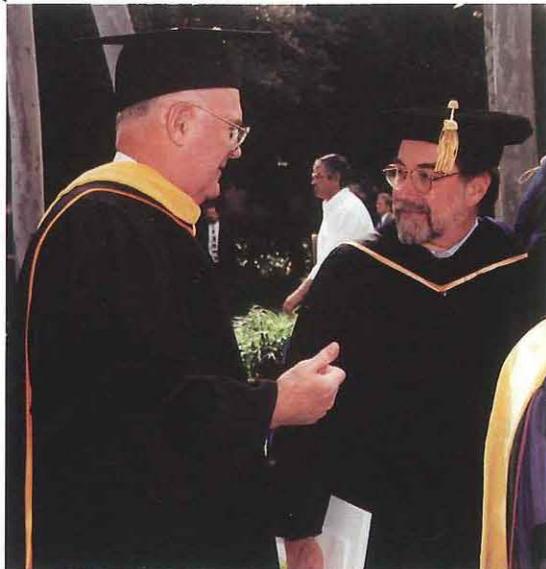
Hale would not be surprised. In 1928, the same year he finally succeeded with Huntington and was cooking up ways to get the 200-inch telescope built, he and Millikan and Noyes were busy completing the scope of Caltech's programs by extracting Thomas Hunt Morgan, an extraordinary biologist, out of an eastern institution. Morgan and his colleagues had, by then, transformed rudimentary and quite abstract Mendelian notions into the chromosomal theory of heredity. Parenthetically, Morgan learned the hard way that Hale, so attentive while Morgan was being recruited, was not much concerned about mundane matters.

Already at their seats, delegates from more than 60 academic institutions and learned societies, led by Honorary Marshal Stephen Hawking (left), watch as the Caltech faculty and the rest of the academic procession file past.





**Below: Gordon Moore (left) and David Baltimore chat during the procession. Has Baltimore perhaps just asked the Board of Trustees chair for lab supplies, as Thomas Hunt Morgan (photo, left) did in 1928?**



**Below: The laureates lead off the academic procession. From front to back:**

**Nobel laureates Rudy Marcus (Noyes Professor of Chemistry), Paul Berg (Cahill Professor in Cancer Research, Stanford), and Ed Lewis, PhD '42 (Morgan Professor of Biology, Emeritus); Crafoord laureates Gerald Wasserburg (MacArthur Professor of Geology and Geophysics) and Seymour Benzer (Boswell Professor of Neuroscience, Emeritus); and Nobel laureates Doug Osheroff '67 (Jackson and Wood Professor of Physics, Stanford) and Renato Dulbecco (president emeritus, Salk Institute).**



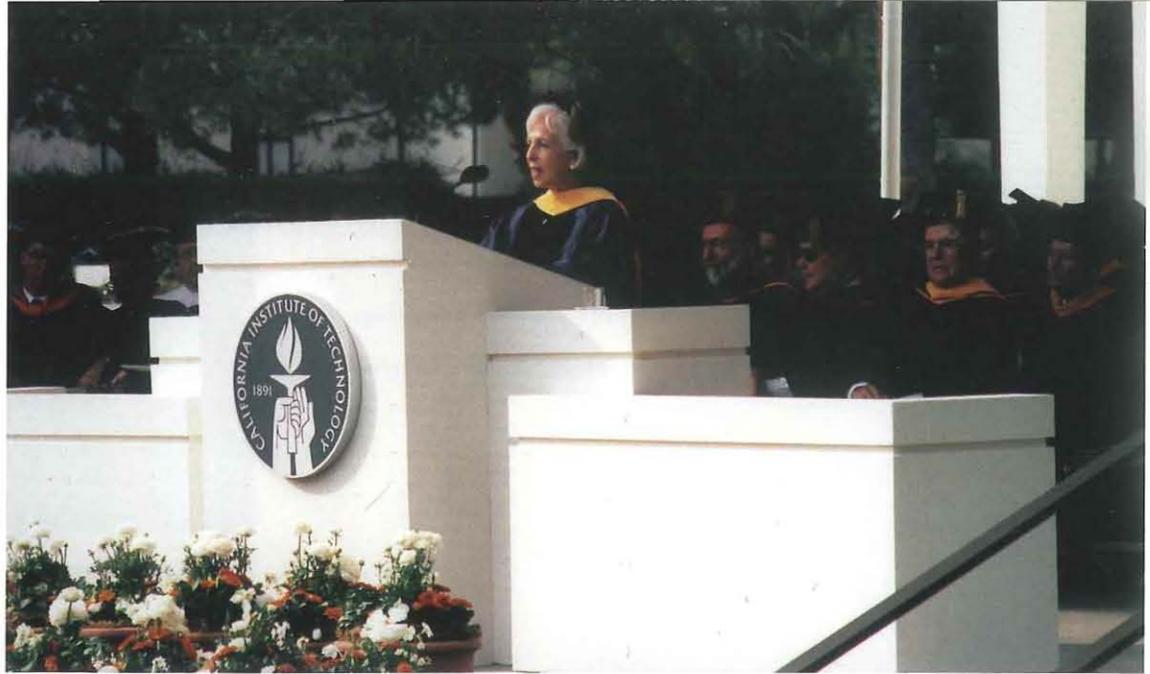
During the six months he was preparing to leave Columbia to come to Caltech, a frustrated Morgan was driven to write directly to Arthur Fleming, president of the Board of Trustees (August 3, 1928, Caltech Archives, Morgan files): "Kindly order thru Western Scientific Company 2500 half pint milk bottles and three gross culture tubes." Dr. Moore, what would you do with such a note from a newly recruited faculty member?

Besides modern biology, the Morgan group brought to Caltech its own then peculiar research habits. As described by Robert Kohler in his book *The Lords of the Fly*, these "elite drosophilists were the oddballs in a social system. . . they were highly ambitious and aggressive, and more devoted to a fast-paced, highly productive style of experimental work than was the norm." Sound familiar? They brought this style to Pasadena; by now it is the highly productive norm here and elsewhere.

But that style, for all its advantages, has a down side. Unlike Hale, Morgan, however brilliant, was not an institution builder. When he finally retired, in his mid-70s, some of the most extraordinary of the younger generation of biologists had passed through his department. Passed through, and gone on to other places. The intense pursuit of great science by single individuals is not enough. It takes an institution to sustain greatness. If all of us had to pursue our research while holding down a job in a patent office, like Einstein, most of 20th-century science would never have happened.

An institutional perspective urges us to make room and provide for young scientists. We must help students, postdocs, and young faculty to develop their own bold visions and independence. And yet the specialized demands of contemporary science leave little time, and sometimes even less motivation, to provide gifted young people with the requisite *liberal* education. Currently, too

From the steps of Beckman Auditorium, Maxine Singer addresses the assembled inauguration guests.



many young scientists have no concept of the history of their own fields, let alone the history and literature of the nation and the world or of the fact that the "liberal" in liberal education has nothing whatever to do with politics. Too many of them still glean from their mentors a narrow view of the roles that they, as scientists, can play in our society.

Hale would have objected to this constricted outlook. In 1907, writing for his former teachers at MIT (from which he graduated in 1890), Hale

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said, speaking of a boy entranced by machines and their design: "He does not yet know that to become a great engineer he should cultivate not merely his acquaintance with the details of construction, but in no less degree his breadth of view and the highest powers of his imagination."

David too understands the need for breadth. His own liberal education and his experience gave him a keen appreciation of the world and its complexities. No doubt he also already knows the local galleries, concert halls, and jazz joints better than most of you.

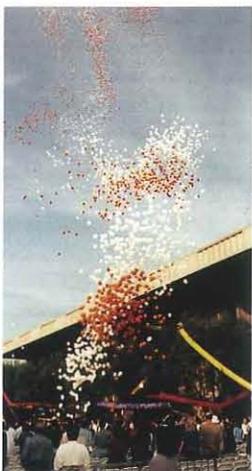
But Hale's and David's worlds are very different. Hale could, without blinking an eye, assume that the scientist or engineer was a "he." But David's liberal education occurred in a place that was founded in the middle of the 19th century specifically to advance the equal and coeducation of men and women. He was exposed there to women who were his intellectual equals, and he is at ease in such a world, as we see from his wonderful marriage to a brilliant scientist, from the way they

have raised the marvelous young woman who is their daughter, and from the female students and colleagues he has encouraged. He knows that neither science nor Caltech should be limited by irrelevant ideas about the packaging of scientific talent.

There's another difference. Hale could concern himself with boys whose upbringing was, like his own, privileged by wealth and an educated family. But in our time, the challenge is to bring the unprivileged boys and girls, growing up without such advantages, into science. Caltech has already engaged this challenge; its programs in the Pasadena schools are a model for many of us all over the country. Caltech's new president will likely want to enhance these efforts.

There are other challenges unique to our time. One is building institutional commitment in an academic world increasingly dominated by a spirit of independent entrepreneurship. We all understand the reasons for this: the structure of a wonderfully productive federal support system for science; the increasing cost of research; the highly competitive nature of scientific work; the speed with which new knowledge is turned into economically rewarding new technology. None of us wants to lose the stimulus of these aspects of our world. But neither do we want our enterprise to fail intellectually by compromising its purpose and character.

In our contemporary world, preserving the special freedom of private institutions requires the exercise of public responsibilities. One essential responsibility is to help the larger society understand the choices and dilemmas posed by science and technology. For this, you can count on your new president. In the early 1970s, faced with the sudden conversion of biology from a descriptive to a manipulative science, he and a few others, were brave enough to ask their colleagues to pause, to think about what they were doing, to construct a



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responsible framework for research, and to do it in public. Again, in the mid-1980s, when the growing AIDS epidemic was still viewed by some as a problem restricted to an unpopular sector of our society, even as a divine punishment, David led a group that would study and define the threat to all and call for a large, targeted research effort. This serious scientific endeavor helped to change the mind of our nation and the world. And all this was going on while he was founding a new institution for biomedical research, one which, after only 15 years, is a major source of new knowledge. Eventually he devoted a substantial part of his own research program to AIDS and the virus responsible for it. Currently he is also committed to lead a national effort to develop an AIDS vaccine.

Your new president also knows that in our society there is a huge price to be paid for bold leadership. The more celebrated an individual, the more likely he or she will be publicly dissected.

We turn heroes into punching bags. No one ever thought in the past that heroes were perfect. But they chose to ignore the warts in order to savour the inspiration. Hale was a national hero, a media success, particularly when he undertook the Palomar project. Would Hale, with his periodic confinements for severe depression, have been allowed today to build Caltech or realize Palomar? Would our society reject Hale's dreams because the dreamer was, as we all are, a flawed human? It might.

The accession of new leadership is a time of promise. But for all the excitement, there is a wariness in the air, a sense of the unknown unfolding. The future seems both secure and indeterminate. In a way, it's like the typical Californian's wariness about this winter's weather. Is it a temporary aberration, or a sign of fundamental change in paradise?

The only response a scientist can make to such uncertainty is optimism. You have, in your new



New president David Baltimore with his wife, Alice Huang (right), and daughter, Teak Baltimore.

president, an optimistic person with the spirit and nature of a leader, who, *with you*, will give shape to the future. He will not be a caretaker. And he will espouse your dreams as well as his own; the grand successes of his presidency will be *mutual* accomplishments; for that is the way of *our* time. Together, all of you can show the world how to "view nature justly."

You have chosen well. I congratulate you all. □



*Currently president of the Carnegie Institution of Washington, Maxine Singer is an eminent biochemist whose wide-ranging research on RNA and DNA has greatly advanced scientific understanding of how nucleic acids behave in viral and human genes.*

*She received her bachelor's degree from Swarthmore (also David Baltimore's alma mater) in 1952 and her PhD from Yale in 1957. She worked as a research scientist at the National Institutes of Health in the Institute of Arthritis and Metabolic Diseases until 1975, when she moved to the National Cancer Institute. In 1988 Singer was named president of the Carnegie Institution, but holds the title of scientist emeritus at NIH and continues to work in her NIH lab. A member of the National Academy of Sciences and its Institute of Medicine, Singer served on the governing board of Yale (1975-90) and continues to serve on that of Israel's Weizmann Institute of Science. She received the Distinguished Presidential Rank Award, the highest honor given to a civil servant, in 1988, and in 1992 she was awarded the National Medal of Science for her "outstanding scientific accomplishments and her deep concern for the societal responsibility of the scientist."*