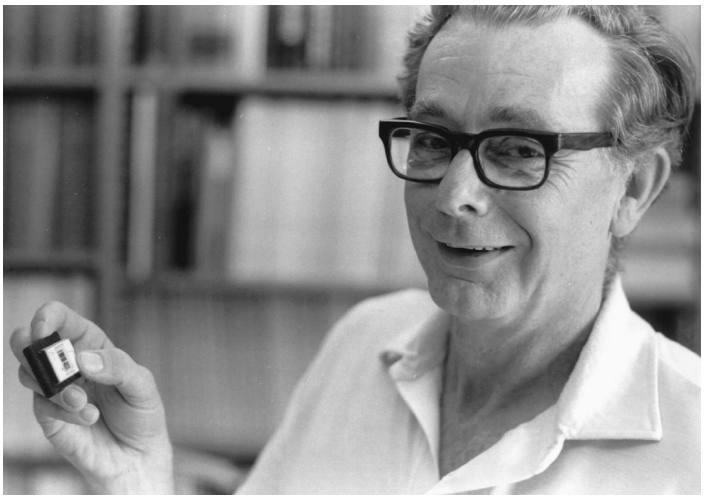


When CCDs revolutionized optical astronomy, Bev Oke was quick to build them into his instruments.

## John Beverley Oke
## 1928 – 2004

Bev Oke, professor of astronomy, emeritus, died of heart failure on Tuesday, March 2, at his home in Victoria, British Columbia, just 21 days short of his 76th birthday. He earned his bachelor's and master's degrees from the University of Toronto in 1949 and 1950, respectively, his doctorate from Princeton University in 1953, and was a member of the Caltech faculty from 1958 until his retirement in 1992. He was also a staff member of the Hale Observatories (Mount Wilson and Palomar) and served as associate director from 1970 to 1978.

His scientific work covered wide areas of astronomical spectroscopy, from white dwarfs to active galactic nuclei, clusters of galaxies, and supernovae. However, he is perhaps best known for devising and building unique instruments for the 200-inch Hale Telescope at Palomar, and later for the Keck. "He was one of the first really serious and really excellent astronomer-instrumentalists," says James Gunn (PhD '66), Higgins Professor of Astronomy at Princeton University Observatory, "and he and the instruments he designed and built were very largely responsible for keeping Palomar and the 200-inch telescope so far ahead of the rest of the world during the '60s, '70s, and '80s."

The first instrument Oke built after joining the Caltech faculty was a single-channel scanner for the 200-inch that could measure the spectra of stars and galaxies in successive 10-nanometer-wide segments, according to Wallace Sargent, the Bowen Professor of Astronomy, writing in the April 1 issue of *Nature*. This spectrophotometer was to play an important role in 1963, when Maarten Schmidt, the Moseley Professor of Astronomy, Emeritus, was taking photographic plates of the mysterious "radio star" 3C273 (now known to be a quasar), and realized that spectral lines indicating the presence of hydrogen, normally seen in the green and violet end of the visible spectrum, appeared to have been shifted to the red. Oke observed the star with his photometer and found a spectral line in the invisible infrared region, which confirmed that the light from 3C273 had a very high redshift, and must have been moving away from the earth at one-sixth the speed of light. The discovery caused a sensation at the time.

"For as long as I knew him, he would be either building an innovative instrument or planning the next one," says Schmidt. And indeed, in 1968, Oke's multichannel photoelectric spectrometer was ready for use on the 200-inch. Its ability to measure the absolute spectral energy distributions of extremely faint objects benefited many astronomers over the years; Oke himself used it to measure the spectra of stars, Seyfert galaxies, and quasars.

In the late 1970s, he designed and built an innovative double spectrograph that split the light beam to go through two separate spectrographs, one fitted with a charge-coupled device (CCD) optimized for blue light, the other with a CCD optimized for red. This instrument, now with upgraded CCD technology, is still in use at Palomar.

More recently, a low-resolution imaging spectrograph that he designed and built with astronomy professor Judith Cohen for one of the twin 10-meter Keck Telescopes in Hawaii produced many of the telescopes' early successes, including the discovery and analysis of hundreds of galaxies at very high redshifts.

Despite building instruments and teaching, Oke found time to publish a large number of scientific papers, recounts Sargent. One of his main achievements was his fundamental work in calibrating the magnitude system used by astronomers to measure starlight. This calibration is still the standard in use today.

"He was as much a workaholic as anybody at Caltech, but seemed in the midst of it all to have much more time for students and really enjoyed interacting with students more than anybody else," says Gunn. "I, for one, benefited enormously from his attention when I was a student, and I was certainly

not alone. I had a special relationship with him which began in the '60s while I was still a graduate student and which continued for many years later, because I was also keenly interested in instrumentation, and passed from apprentice and friend to very close colleague and friend. I think we have lost someone who was vastly important to the field in ways we will probably never properly recognize." In *Nature*, Sargent describes him as "a modest, phlegmatic man with a laconic sense of humor. His lectures were clear, matter of fact and unadorned with fanciful speech. He led by example, not by fine words."

On retiring from Caltech in 1992, Oke returned to his native Canada to continue his research at the Herzberg Institute of Astrophysics in Victoria. At the time of his death, he was working on the design of a spectrograph for the proposed Thirty-Meter Telescope, a joint venture between Caltech, the University of California, the Association of University Research in Astronomy, and its Canadian equivalent. He is survived by his wife, Nancy; sons, Christopher and Kevin; and daughters, Jennifer and Valerie. "His greatest indulgence was his MG sports car, which he delighted to drive along the S6 'highway to the stars' up to Palomar Mountain," Sargent writes. He was still working on it the day before he died. □—*BE*

## William Hayward Pickering
## 1910 – 2004

Bill Pickering, "Mr. JPL," the father of American space exploration, died March 15 of pneumonia at his home in La Cañada Flintridge. He was 93.

Pickering was born in Wellington, New Zealand, and grew up in the province of Marlborough. Marlborough was also where Ernest Rutherford, "another giant of world science," was born and grew up, noted the Honorable Darryl Dunn, New Zealand's consul general, at the memorial service for Pickering in Beckman Auditorium March 20. "Like Rutherford, he had to go overseas to pursue his career," said Dunn. "Like Rutherford, Bill found a new home that he loved greatly. And like Rutherford, Bill never forgot the land of his youth."

While studying electrical engineering at the University of Canterbury in Christchurch, New Zealand, Pickering was encouraged by an uncle to study at Caltech. He emigrated to the United States in 1929, earning his BS at the Institute in 1932 and MS in 1933. After finishing his PhD in physics in 1936, he joined the Caltech electrical engineering faculty. In 1941 he became an American citizen.

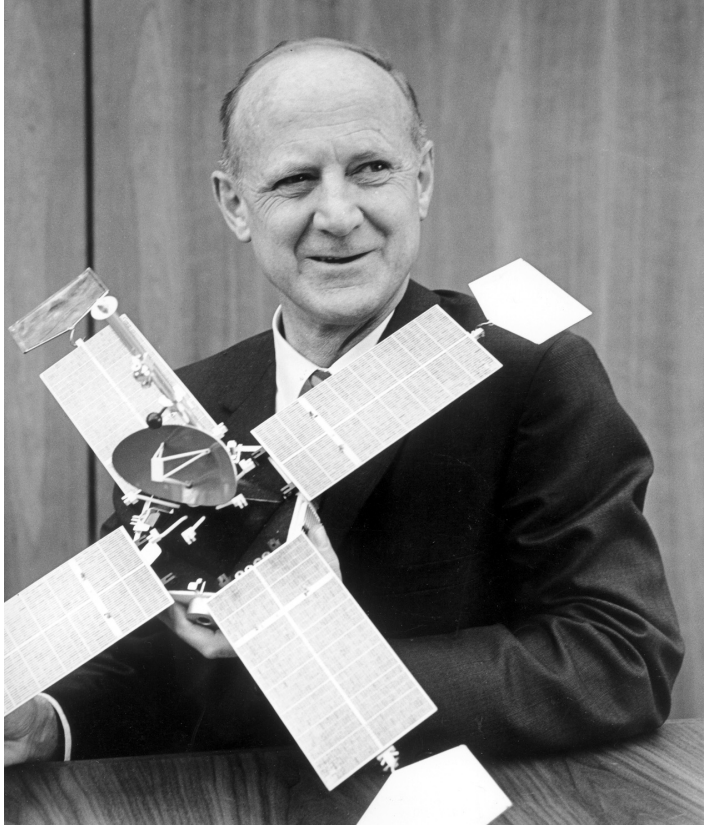
Then in 1944 Pickering began his long, distinguished career at the Jet Propulsion Laboratory; he became its director in 1954 and led it through the decades of the Cold War and the space race. JPL was originally set up under the U.S. Army to support guided-missile research and development, and Pickering worked on the Private and Corporal rockets in the Lab's early days. It was Pickering, said Charles Elachi, the current JPL director, "who made the critical move in the late 1950s to have JPL do more than building the rocket—build what's on *top* of the rocket. Without that foresight, that vision, and that boldness, JPL would not be what it is today."

When the Soviet Union launched Sputnik in the fall of 1957 and the space race began, Pickering led the JPL team that, in a mere 83 days, launched the first U.S. satellite, Explorer 1, on January 31, 1958. And also in 1958, when JPL, under Caltech's management, was transferred to the newly established National Aeronautics and Space Administration, Pickering, when offered the choice of either human or robotic exploration of space, chose the role of sending unmanned spacecraft out into the solar system. There followed subsequent Explorer missions, the Ranger and Surveyor missions to the moon, and the several Mariner flybys of Venus and Mars. He appeared on the cover of *Time* magazine twice—in 1963 and again in 1965. When he retired as director in 1976, the two Voyager missions were being prepared for launch on their spectacular tour of the outer planets, and Viking 1 was about to land on Mars. And when Spirit and Opportunity landed on Mars last January, Pickering was there at JPL, celebrating the triumph.

Pickering brought to the Lab strong leadership, good engineering, and good management, said Elachi at the memorial service. "He was unflappable," and "ran the lab with a steady hand." And a sense of humor. Elachi spoke of how Pickering used to describe the lab "as a graduate student project that got out of hand," whose main task in the early days was to figure out "how to make a rocket that won't blow up."

Several former JPL administrators also spoke at the memorial, each in his own way praising Pickering's role in setting JPL on its trajectory to the planets. Lieutenant General Charles H. Terhune Jr. an Air Force rocket man who was JPL's deputy director from 1971 to 1983, noted the Lab's first rocket projects and said, "There was no doubt that he wanted to go into space as opposed to simply making weapons. He inspired vision in people. He tried out new ideas. He didn't lose sight of his objectives."

Eberhardt Rechtin (BS '46, PhD '50), assistant director of JPL from 1958 to 1967 and chief architect of the Deep Space Network, was a student of Pickering's and spoke of "Pickering's boys"—his Caltech students. "He taught by example; he taught us



**Bill Pickering shows off a model of a Mariner spacecraft in 1967.**

discipline; he taught us precision; he taught us about humility." He was everyone's favorite professor and also taught his students "how important it was that things had to work, not just be."

Rechtin described how the Deep Space Network was born—not in 1963 as officially stated, but back in the days before Explorer's launch. Pickering understood "about the importance of that particular flight, of the interest that the world would have, and how important it was to measure it." And when the Army declared a tracking system unnecessary, Pickering sent his tracking stations ("all we needed was a suitcase full of stuff and we could do anything") to British Commonwealth friends around the world—the first international network, said Rechtin. "And it was the Nigerian station that first heard the signals from Explorer that told us of the existence of the Van Allen ionization belts. The Nigerians were listening at the right time at the right place and they heard us."

Tom Everhart, president of Caltech from 1987 to 1997, also mentioned the discovery of the Van Allen belts. For Pickering, he said, "it wasn't enough to have a beeping satellite as the Russians had. Ours needed to do something useful and it did." Everhart put that down to Pickering's Caltech education. "He has stated that when he knew that Explorer I was successfully orbiting the earth, that was one of the proudest moments of his life."

"I believe Bill Pickering will go down in Caltech history as a man who demonstrated that the Institute could take on a new role, leading a government-funded mission laboratory to make unprecedented discoveries about our planetary system," said Everhart. "He emphasized the synergy and mutual dependence between science and engineering."

Pickering received many honors during his long life, among them the National Medal of Science, NASA's Distinguished Service Medal, and the New Zealand Order of Merit. He was awarded an honorary knighthood by, as Dunn, the consul general, called her, "the Queen of New Zealand."

New Zealand always claimed him as a "beloved son." Dunn remembered seeing the first Mars pictures in 1965 and "the distinguished man with the odd American accent" presenting them. "I still remember my mother pointing to him and saying with pride, 'That's Dr. Pickering. Did you know he's a New Zealander?'"

Donations in his memory may be made to the William H. Pickering Scholarship for New Zealand Graduate Students at Caltech.

He is survived by his wife, Inez, and his daughter, Elizabeth Pickering Mezitt. His son, William Balfour, died two days before him. □

*—JD*

## Honors and Awards

**David Baltimore**, president of Caltech and Nobel laureate, was chosen by the Israel Academy of Sciences and Humanities to deliver the Albert Einstein Annual Lecture at the academy's headquarters in Jerusalem on March 14, when he spoke on "Biotechnology—An Industry with a Future."

**Andrew Blain**, assistant professor of astronomy; **Nathan Dunfield**, associate professor of mathematics; **Sunil Golwala**, assistant professor of physics; **Vadim Kaloshin**, associate professor of mathematics; **Re'em Sari**, associate professor of astrophysics and planetary science; and **Tapio Schneider**, assistant professor of environmental science and engineering have all received 2004 Sloan Research Fellowships. Intended to enhance the careers of the very best young faculty members nationally in the fields of chemistry, computational and evolutionary molecular biology, computer science, economics, mathematics, neuroscience, and physics, the highly competitive two-year, $40,000 awards are available for any activity directly related to a Fellow's research, including equipment, technical assistance, professional travel, or trainee support.

**David Charbonneau**, Millikan Postdoctoral Scholar in Astronomy, has been selected to receive the Astronomical Society of the Pacific's Robert J. Trumpler Award, which "is given each year to a recent recipient of the PhD degree in North