

**THOMAS K. CAUGHEY
1927 – 2004**



At a memorial service held May 5 for Thomas Kirk Caughey, the Richard L. and Dorothy M. Hayman Professor of Mechanical Engineering, Emeritus, who died December 7, 2004, colleagues paid tribute to the talented Scotsman who came to Caltech as a graduate student and stayed there all his life.

Caughey was a leader in the fields of dynamics and vibrations, fluid-induced forces in turbomachinery, stochastic nonlinear systems, and structural monitoring and active control of large structures. His awards included the Freudenthal Medal and the von Kármán Prize, both from the American Society of Civil Engineers.

A native of Rutherglen, Scotland, he became interested in acoustics and engines (especially quiet electric engines) because of the noisy tugs on the river Clyde, whose single-cylinder engines could be heard for miles around. At Glasgow University, he earned undergraduate degrees in both electrical and mechanical engineering in 1948, then worked at Howden & Co., an engineering company, where he devised an automatic machining system for a new type of rotary compressor that earned him a welcome on the shop floor.

A Fulbright scholarship took him to Cornell in 1951, where he earned an MME in 1952. That same year he

came to Caltech, where he earned his PhD in just two years. Caltech made him an assistant professor in applied mechanics in 1954, and a full professor in 1962. He was named the Hayman Professor in 1994, and the Hayman Professor, Emeritus in 1996.

One of his former graduate students, Sami Masri, now a professor at USC, said, "He was without a doubt one of the most, if not the most, influential member of the community of workers in the vibration field. His contributions are without parallel and have touched every engineer currently working in dynamics and control."

Chris Brennen, the present Hayman Professor of Mechanical Engineering, talked about his collaboration with Caughey and Allan Acosta, the Hayman Professor of Mechanical Engineering, Emeritus, in the late 1970s on a NASA-sponsored research project motivated by problems in the development of the space shuttle's main engine. Their research led to 31 ABC (Acosta, Brennen, Caughey) papers and resulted in defining a new set of fluid-structure rotordynamic forces and instabilities. "That research epitomized his genius," Brennen said. Caughey's engineering experience was invaluable in the design and fabrication of a unique experimental facility whose success has yet to be bettered. Recently, that

30-year-old Caltech facility was dismantled by NASA and transported to Huntsville, Alabama, where it is being put to use again.

Amnon Yariv, the Summerfield Professor of Applied Physics and professor of electrical engineering, told the audience that Caughey also influenced his work in the field of lasers. "Back in 1974," he said, "I became interested in the topic of noise and lasers. Lasers are said to be ideal generators of pure light, but a laser is a nonlinear oscillator and has random noise, which limits its usefulness." When Yariv tried to eliminate the noise, he ran into mathematical problems. On mentioning this to Caughey one day, Caughey said, "You know, I've written a paper 14 or 15 years ago which you may find interesting." Yariv found that the mathematics in this paper was tailor-made for the laser field.

Caughey had a vast practical knowledge of the design of mechanical, electrical, and electronic devices, and was called in to fix things in other parts of Caltech. According to Acosta, Physical Plant often asked him to solve problems such as corrosion in the swimming pool and noisy cooling fans on the power plants. The astronomers asked him if he could stop the dome of the 200-inch Hale Telescope from lurching when the direction of rotation was changed; Caughey told them all it needed was a dedicated screw. (Several people at the memorial service commented that he would also have been able to fix the faulty microphone on the podium.)

Paul Jennings, provost and professor of civil engineering and applied mechanics, who was a graduate student in his class in the days when Caughey was a "skinny, young hotshot," remembered how Caughey was "blazingly fast

on the blackboard," something that also left a lasting impression on Per Reinhall, another of Caughey's graduate students and now a professor at the University of Washington. Many spoke of Caughey's amazing breadth of knowledge, and how he was equally comfortable discussing dynamics, cars, politics, and abstract mathematics. His great love was classical music, and he was an active and much-valued member of the Coleman Chamber Music Association for many years.

Caughey treated everyone with the same courtesy, be it the president or the gardeners, and was a generous and supportive colleague. In the words of Jim Knowles, the Kenan Professor and Professor of Applied Mechanics, Emeritus, "A man of extraordinary accomplishments and striking modesty."

He is survived by his wife, Jane; children Penelope, Catherine, Christine, and William; four grandchildren; and six great-grandchildren. □—BE



In 1959, Caughey designed a portable earthquake-making machine, a.k.a. an eccentric-mass vibration generator that was the forerunner of the shaking machines used by civil engineers around the world today.

CORNELIUS J. PINGS

Cornelius John Pings (BS '57, MS '52, PhD '55), a former vice provost, dean of graduate studies, and professor of chemical engineering and chemical physics at Caltech, died last December 6 of cancer. He was 75.

After earning his doctorate in chemical engineering, Pings served on the Stanford University faculty, then joined the Caltech faculty in 1959. His research was in applied chemical thermodynamics, statistical mechanics, and liquid-state physics. He served as vice provost and dean of graduate studies from 1971 to 1981, then went to the University of Southern California as provost and senior vice president for academic affairs. In 1993, he became president of the Association of American Universities, where he served until 1998.

Pings was chairman of the Committee on Science, Engineering, and Public Policy, president of the Western College Association, and chairman of the Pasadena Redevelopment Agency.

In 1989, Caltech honored Pings with the Distinguished Alumnus Award. He was also a member of the Caltech Associates President's Circle. He is survived by his wife of more than 40 years, Marjorie; his son, John; and his daughters, Anne and Mary. □—RT



Chris Brennen, above right, who was recently named the Richard L. and Dorothy M. Hayman Professor of Mechanical Engineering, has also won this year's Richard P. Feynman Prize for Excellence in Teaching. Students praised his perpetual enthusiasm and lucid teaching style, which included riding his bike into the swimming pool to demonstrate fluid mechanics.



Cornelius Pings was on our cover in January 1962. Pings, on the left, and research fellow Brian Smith are determining the optical properties of liquid argon.

NEW NAS AND AAAS MEMBERS

Newly elected to the National Academy of Sciences are **Richard Andersen**, the Boswell Professor of Neuroscience; **James Eisenstein**, the Roshek Professor of Physics; and **Wallace Sargent**, the Bowen Professor of Astronomy, as well as **Roger Blandford**, a former Caltech faculty member and visiting associate in physics.

New fellows of the American Academy of Arts and Sciences include **Andrew Lange**, the Goldberger Professor of Physics; **Barry Simon**, the IBM Professor of Mathematics and Theoretical Physics; **David Tirrell**, chair of the Division of Chemistry and Chemical Engineering and McCollum-Corcoran Professor and professor of chemistry and chemical engineering; and **William Bridges**, the Braun Professor of Engineering, Emeritus.

David Goodstein, Caltech's vice provost, professor of physics and applied physics, and Gilloon Distinguished Teaching and Service Professor, has had his book *Out of Gas: The End of the Age of Oil* (New York: W. W. Norton & Company, 2004) chosen by the *New York Times Book Review* as one of its 100 Notable Books of the Year for 2004. In the book, Goodstein sees difficult choices facing human society worldwide as global oil production peaks in the near future.

Mark Konishi, Bing Professor of Behavioral Biology, and Fernando Nottebohm of Rockefeller University have jointly received the American Philosophical Society's 2004 Karl Spencer Lashley Award for their work illuminating the physiological basis of the vocal-learning abilities of certain birds. Konishi was recognized for his experiments demonstrating that birds "depend heavily on their ability to monitor their own voice, both to produce previously memorized songs and to maintain them once developed."

Chris Martin, professor of physics, has received his second NASA Public Service Medal, in recognition of "exceptional scientific achievement in ultraviolet astrophysics and contributions to the success of the Galaxy Evolution Explorer." Martin is principal investigator for JPL's Galaxy Evolution Explorer, or GALEX.

John Preskill, MacArthur Professor of Theoretical Physics, has been chosen as the 2005 Lawrence C. Biedenharn Lecturer at the University of Texas at Austin.



Perfectly Reasonable Deviations
from the Beaten Track: The Letters
of Richard P. Feynman
 edited by Michelle Feynman
 Basic Books, 2005
 486 pages, \$26.00

To compile this book of letters written by her father, Michelle Feynman sifted through the contents of 12 filing-cabinet drawers photocopied from the Feynman Papers and shipped out to her by the staff of the Caltech Institute Archives. After winnowing out the technical papers, she picked the best of the personal letters, added family letters and photos stored in her basement, and compiled this fascinating insight into the everyday life of Richard Feynman.

The letters are ordered more or less chronologically, and letters are next to their replies. The first is from October 1939, when the 21-year-old graduate student writes to his mother from Princeton (he includes a mathematical puzzle for his father), and the last was written six months before his death in February 1988. As well as letters to his mother, endearing letters to his sweetheart, then wife, Arline, who was dying of TB, and letters written in hotels abroad to Gweneth, Michelle's mother, whom he married in 1960, there is correspondence with colleagues, the media,

people trying to give him honors he didn't want, and surprisingly long replies to members of the public.

There's something of interest on every page, and it's fun to dip into the book at random and follow a thread of correspondence (but it's hard to stop.) Much of the charm of these letters is that they are in Feynman's own voice, untouched by copyeditors. His writing style, though perhaps not always grammatically correct, is vibrant and energetic, and he comes across as a charming, considerate, humble, and very amusing person.

With a foreword by Timothy Ferris, and an introduction by Michelle on what it was like having Feynman as a father (great fun), everybody, even if new to Feynman, will enjoy reading this glimpse into almost five decades of his life. □—BE



Strange Angel: The Otherworldly
Life of Rocket Scientist John
Whiteside Parsons
 by George Pendle
 Harcourt, 2005
 368 pages, \$25.00

In 1952 rocket scientist Jack Parsons lost his right arm and the right side of his face to an explosion at his house on Orange Grove Avenue, in Pasadena, California. Still conscious, he was rushed to Huntington Memorial

Hospital, where he died. In the aftermath of the explosion, the public learned of a remarkable pioneer in the field of rocketry, for whom the occult was as important a realm as that of science.

As much historical sketch of Southern California, Caltech, rocketry, and the Ordo Templi Orientis as a life of Parsons, *Strange Angel* starts with his horrific death, then flashes back to his idyllic boyhood growing up in a wealthy family on Orange Grove Avenue, next to the "Huckleberry Finn playground" of the Arroyo Seco. Dyslexic, Parsons nonetheless developed an interest in explosives, chemistry, and rocketry, and gained friends such as Ed Foreman and Frank Malina (MS '35, Eng '36, PhD '40), with whom he carried out rocket experiments at Caltech. Forced off campus in the wake of too many unnerving explosions and mishaps, the "Suicide Squad," as they were known, leased six acres in the upper Arroyo Seco, threw together some ramshackle buildings, and began what ultimately became JPL.

Dreamer, poet, science-fiction enthusiast, and temperamental idealist, Parsons yearned to apply the methods of scientific experimentation to "magick" fully as much as to rocketry. In the '30s and '40s he played a key role in developing the Jet-Assisted Take-Off (JATO) program, and in the founding of JPL and Aerojet, but increasingly turned to the occult as he found himself left behind by the more businesslike world of postwar rocketry, which had little place for mavericks and romantics.

Strange Angel is a fast-paced and fascinating look at the life of a man beckoned on to dissolution and destruction by the very idealism and talent that made him an important and creative force in the field of rocket propulsion. □—MF



Astro Turf: The Private Life of
Rocket Science
 by M. G. Lord
 Walker & Company, 2005
 253 pages, \$24.00

Part personal memoir, part meditation on family life, and part history of the space program and of JPL, *Astro Turf* explores the cultural complexities underlying the deeply human endeavor of reaching out to other worlds, and the ways in which the very humanity of that endeavor was for decades obscured and even stifled by a kind of masculine mystique.

Beginning with a 1997 creativity seminar conducted at JPL by Mars Exploration director Donna Shirley, during which M. G. Lord experienced a reemergence of memories about her father, and concluding with the successful landings of the Mars rovers Spirit and Opportunity in 2004, Lord undertakes her own voyage of discovery as she seeks to understand her father's emotional absence from his family at a time when Lord's mother was dying of cancer. Because he was working on the Mariner project at the time, the book comes to encompass much else as well, including the FBI's persecution of Frank Malina, JPL's first director; the role of science fiction as inspiration, as much for Lord herself as for scientists and engineers; and the changing perception of gender among those who have engaged in interplanetary exploration over the past half century. □—MF