

Caltech *News*

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Jane Sanders, a member of the professional staff, with an instrument that speeds up the slow, laborious process of DNA sequencing. The DNA sequencer is run by a computer, which shows data from the sequencer on its screen, and then stores it in the form of digits. Sanders is involved in one of five centers in the biology division that will be part of the new NSF Center for an Integrated Protein and Nucleic Acid Biotechnology.



Caltech a winner in NSF competition

Caltech will receive funding for one of 11 NSF Science and Technology Centers, and will play a major role in another center.

The National Science Foundation (NSF) has announced that it intends to support a proposal by Caltech for one of 11 NSF Science and Technology Centers, and that it will support a separate joint proposal in which Caltech will play a major role.

The Center for the Development of an Integrated Protein and Nucleic Acid Biotechnology will be led by Leroy Hood, the Ethel Wilson Bowles and Robert Bowles Professor of Biology. Hood has resigned his responsibilities as chairman of Caltech Division of Biology to devote full time to the new center. In addition the NSF will support a joint proposal by Rice University and Caltech for the Center for Research on Parallel Computation. This center will be based in Houston, Texas.

"We are elated with the NSF announcement," said Caltech president Thomas E. Everhart. "Scientists from all over the United States submitted 323 proposals for centers. Caltech is a relatively small institution, and for our faculty to be part of two of the centers selected for funding is a distinction."

According to the NSF, it is establishing the centers to promote basic research on complex problems that are of large scale and long duration, and that may require special facilities or collaborative relationships. Applicants were required to shape their proposals around a unifying intellectual theme, to include a strong educational component, to incorporate mechanisms for stimulating the transfer of basic research knowledge to those interested in building on it, and to establish linkages with government, industry, states, or other institutions.

The NSF intends to provide first-year funding of about \$3,050,000 for the

Center for the Development of an Integrated Protein and Nucleic Acid Biotechnology. According to the NSF, the actual award will be negotiated by the NSF and the host institution through a cooperative agreement. NSF support after the first year of the five-year award is dependent on available funds and on the center's satisfactory progress. A comprehensive review after the third year will determine whether the center will be funded for an additional five years.

The Center for the Development of an Integrated Protein and Nucleic Acid Biotechnology will be a cooperative effort by scientists from Caltech and from Caltech's Jet Propulsion Laboratory. They intend to improve upon and integrate the most advanced techniques in genetic engineering, protein chemistry, and data analysis in order to develop new technology to speed research in protein and gene regulation.

Their efforts should ultimately open up new possibilities for understanding, diagnosing, and treating diseases at the molecular level. New technology will be in a form that can easily be transferred to biological scientists in academia and industry. Projects include development of a new and more sensitive method for determining how the components of DNA and protein are ordered, and new methods for the analysis of biological data bases that will allow scientists across the country to compare this sequence data on proteins and genes.

A major aim of the center will be the development of instrumentation for the synthesis and sequencing of DNA and proteins, and for the handling of enormous amounts of data via computers. This work should make an important

contribution to the eventual sequencing of the human genome, a long-range goal in biotechnology.

One of the emphases of the center will be the dissemination of information to other academic centers and to industry. Provisions have been made to accommodate visitors having a number of levels of expertise and authority, so that advances can be shared quickly. Another major aim of the center is to keep the U.S. in the forefront in biotechnology.

The NSF also intends to provide first-year funding of \$4,100,000 for the Center for Research on Parallel Computation, which will be based at Rice University. "Originally, Caltech and Rice submitted proposals in the area of parallel computation, both of which made it to the finals," said Barclay Kamb, Caltech vice president and provost, and professor of geology and geophysics. "But in discussions with their counterparts at the other institutions, the scientists at Rice and Caltech decided that a joint proposal even better epitomized the NSF's stated goal of enhancing linkages with other institutions. The Argonne National Laboratory and the Los Alamos National Laboratory will also be part of this center."

Director of the center will be Professor Ken Kennedy of Rice University. Principal participants at Caltech, who will lead research groups in several major technical areas addressed by the center, will be Herbert Keller, professor of applied mathematics (algorithms and computational mathematics); Charles Seitz, professor of computer science (computer architecture and operating systems); and Geoffrey Fox, professor of

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FRIENDS

Mettler Professorship established

President Thomas E. Everhart has announced that the TRW Foundation has contributed \$750,000 to help establish the Ruben F. and Donna Mettler Professorship in Engineering and Applied Science.

The professorship is named in honor of Ruben F. Mettler (BS '44, MS '47, PhD '49), chairman of the Institute's Board of Trustees. Mettler retired in December as chairman and chief executive officer of TRW Inc., an aerospace and high-technology company headquartered in Cleveland, Ohio. Dr. and Mrs. Mettler also contributed \$750,000 to create an endowed professorship totaling \$1.5 million.

Mettler's extensive contributions to business, education, and science have included roles as chairman of The Business Roundtable, chairman of The Business Council, chairman of the National Alliance of Business, chairman of the United Negro College Fund's national campaign, and chairman of the President's Task Force on Science Policy. He was elected to the National Academy of Engineering in 1965.

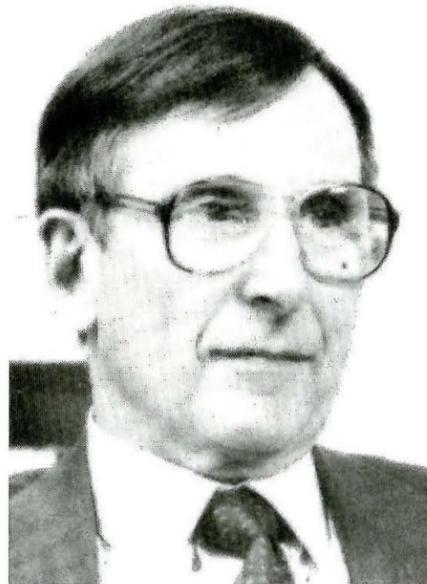
After Caltech, Mettler spent five years with Hughes Aircraft Company and a year as consultant to the Department of Defense. He then joined the Ramo-Wooldridge Corporation, where he participated in several of the early U.S. ballistic missile and space projects.

When Ramo-Wooldridge merged with Thompson Products to form the company now known as TRW Inc., Mettler was named executive vice president and then president of its Space Technologies Laboratories subsidiary. In 1965 he was appointed president of TRW Systems Group and in 1969 was named TRW president. He was elected chairman and chief executive officer in 1977.

In 1966 Dr. Mettler became one of the first alumni to receive Caltech's Distinguished Alumni Award. He was elected to the Caltech Board of Trustees in 1969, vice chairman of the board in 1983, and chairman in 1985.



Walter Weisman



Arthur Rock

Two named to Board of Trustees

Caltech welcomed two new members to the Board of Trustees during 1988. They are Walter L. Weisman, former chairman and chief executive officer of American Medical International, Inc. (AMI), and venture capitalist Arthur Rock.

Weisman received his JD degree from Stanford University in 1959, and practiced law in Los Angeles for nine years before joining Chanco Medical Industries in 1969 as vice president and secretary.

In announcing Weisman's appointment, Caltech's board chairman, Ruben F. Mettler, said, "Mr. Weisman is indeed a strong addition to the board. His abilities and experience will be important to the Institute. We are all looking forward to his participation in the affairs of the Caltech community."

In 1972, Chanco was acquired by AMI, a hospital management firm. Between 1972 and 1988, he served the company as senior vice president of operations, executive vice president, chief executive officer, and chairman. He left AMI in 1988 and is currently a private investor.

Weisman is a trustee of the Los Angeles County Museum of Art. He is a member of the Beverly Hills, Los Angeles County, and California Bar Associations.

He also serves as a director of the Los Angeles Area Chamber of Commerce,

and is a trustee of the Committee for Economic Development. He is a member of the board on health care services of the Institute of Medicine of the National Academy of Sciences, and is a director of the Greater Los Angeles Partnership for the Homeless. He and his wife, Sheila, are residents of Woodland Hills.

Arthur Rock has enjoyed a distinguished business career and is currently the principal of the San Francisco-based Arthur Rock and Company.

"Caltech is fortunate to be able to attract people of Arthur Rock's caliber to become trustees of the Institute," said Mettler. "He is certain to bring new vitality and fresh ideas to Caltech."

Rock is a graduate of Syracuse University, and earned his MBA from Harvard in 1951. In addition to his personal investments, he has served as an executive or board member of many prestigious firms, including Xerox; Apple Computer; Intel Corp; Diasonics, Inc.; Teledyne, Inc.; and Argonaut Group Inc.

He has served as a director of the University of California Business School, the Visiting Committee of the Harvard Business School, the San Francisco Opera Association, and the San Francisco Museum of Modern Art. He and his wife, Toni, live in the San Francisco Bay area.

New publication available

There is a new publication for Caltech alumni and other friends. It is called *Techniques*, and is devoted to personal financial and estate planning. The newsletter will be published three times a year by the Institute's Office of Gift and Estate Planning.

The inaugural issue focused on tax-planning tips for the end of 1988 and for all of 1989. Helpful suggestions included ways of saving taxes now while preserving income for the future.

The first issue of *Techniques* also featured several prominent members of the Caltech community who have benefited from using trust and annuity gifts in their overall estate planning.

Anyone who would like to receive *Techniques* and did not get the first issue may obtain a copy by contacting the Office of Gift and Estate Planning, 105-40, Pasadena, California 91125, or by calling 818/356-2927.

AIAA announces establishment of Zarem Awards

The American Institute of Aeronautics and Astronautics has announced the establishment of the Abe M. Zarem Outstanding Student Awards in Aeronautics and Astronautics. The awards honor Zarem (MS '40, PhD '44), founder of Electro-Optical Systems and Xerox Development Corporation, AIAA Fellow, member of the National Academy of Engineering, and currently a management consultant.

The awards consist of a bronze medal and certificate, a cash honorarium, and a travel stipend. They will be given annually to a graduate or undergraduate for the most outstanding technical papers submitted to the AIAA—one for aeronautics and one for astronautics. Zarem established the awards to "identify talented students and to challenge them to expand on their accomplishments."

About 40 members of The Associates visited the Owens Valley Radio Observatory on October 28. Their host was Nick Z. Scoville, director of the observatory.



Common needs and goals redefine an old relationship between Caltech and some of its friends in industry.



Kerry J. Vahala holds a micrograph (a photograph taken on a scanning electron microscope) of a nanometer-scale electrical probe. The probe is used in conjunction with a fiber optic light collection system inside the scanning electron microscope, in the study of ultra-small solid state devices.

For the past four years, common goals and needs have been redefining an old relationship between Caltech and some of its friends in industry. Through the Program in Advanced Technologies (PAT) this redefinition has led to a new level of cooperation, one that has proved highly important to the success of research programs in several areas of engineering and applied science.

Says William B. Bridges, designated principal investigator for PAT, "Research today, more than ever, is a joint venture between universities and industry. The days are gone when basic work was done first in university laboratories by professors and students, published in academic journals, and only then considered for applications by industrial groups.

"Today, researchers in both academia and industry attend the same technical meetings and read the same technical journals to learn of the progress in each others' groups. The opportunities for joint projects are greater than ever before; indeed, there is a need for expanded cooperation to increase the efficiency of the research process."

At Caltech, an answer to meeting the needs created through this changing research environment has been found through PAT, a venture among Caltech and four industrial partners: Aerojet General Corporation, General Motors, GTE Laboratories (1984-88), and TRW Inc. Each of the industrial organizations contributes \$200,000 per year for five years (1984-89) to support research programs in three areas: fluid dynamics, solid-state materials, and electronics.

"PAT is an exciting program for us," says Dr. Arden L. Bement, vice president for technical resources, TRW Inc. "The new ideas being explored under PAT are giving us an early introduction to important new technological concepts and developments. Also, we believe that the opportunity to establish a close relationship with Caltech's bright young faculty is in our long-term best interests for acquiring the talent and

Caltech and industry join forces

technology that we will need to stay at the cutting edge in our business."

Under the structure of PAT, the initiative for defining specific research projects rests with individual faculty investigators, who make proposals to a communal pool of money, much as they would for federal grants. Proposals are evaluated by an advisory committee, which includes representatives from sponsoring organizations. The program is administered by Bridges, the Carl F Braun Professor of Engineering, with guidance from the advisory committee.

One objective of the program is to support new research efforts by new or junior faculty. The support is available through direct grants for salary and expenses, fellowships for outstanding graduate students, and equipment grants. Proposals from senior faculty members are also considered. The grants are intended to provide seed money for projects that will later be funded from other sources; they generally range in size from 20 to 60 thousand dollars.

"The acquisition of major funding for a new and innovative research project is much more likely if a seed project can first confirm certain ideas put forth, and perhaps generate some early results," says Kerry J. Vahala, assistant professor of applied physics and a PAT grant recipient. "Establishing the seed effort is often very difficult, however, especially for younger members of the faculty. PAT provides funding for such seed efforts. Two projects in my own research program were initiated with the help of PAT funding. These projects are now supported by government agencies." Vahala's PAT funding included a research grant to study the properties of advanced semiconductor lasers and an equipment grant.

Some of the other research projects supported by PAT have included the use of highly concurrent computers to numerically simulate vortex dynamics and molecular gasdynamics, the investigation of novel synthetic pathways for preparing superconducting metal oxides, and studies in pattern recognition and

robust control theory.

Another objective of the program is to encourage technical exchange between Caltech faculty members and technical personnel of the sponsoring industrial organizations. To aid in this transfer of information, Caltech hosts a meeting each year where faculty participants describe their research. Individual visits by technical personnel to Caltech, and visits by Caltech faculty and students to sponsors' laboratories are also arranged upon request.

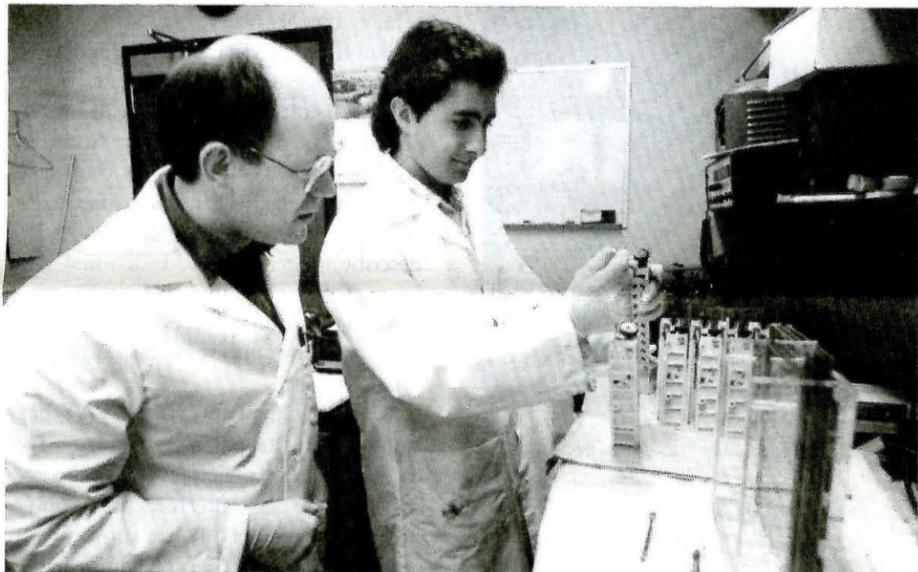
During its first four years, PAT has funded 27 principal investigators—12 of them within their first four years as members of the Caltech faculty—and 28 research grants. It has supported 16 graduate students (two of whom have joined one of the sponsor companies as staff members); and awarded 9 grants for equipment. Eight patent disclosures have been written, and five patent applications filed. Sponsoring companies receive an automatic non-exclusive royalty-free license to all technologies resulting from PAT-supported research.

"But the success of the program must be measured in human terms," says Bridges. "New channels of communication have opened between Caltech faculty and students and our industrial partners. New research ideas have found a timely implementation. Young faculty members have received enhanced opportunities at a critical time in their careers, and most of their research has been successfully continued with funding from other sources."

The program has been so successful for Caltech that Bridges and members of his advisory committee are reexamining the technical emphasis of the program in order to propose an arrangement of a similar kind for 1989-1995. Discussions with a number of companies are under way.



One unit of a supercomputer composed of 16 individual machines that work concurrently to solve problems is under scrutiny by Caltech faculty members who are instrumental in the NSF Center for Research on Parallel Computation. They are Charles Seitz (seated), Herbert Keller, Geoffrey Fox, and Provost Barclay Kamb. Architecture for the supercomputer, the Ametek 1010, was developed at Caltech by Seitz and his students. By mid-1989, the supercomputer will be composed of 256 individual computers. Donor of the super problem solver is Ametek Inc., whose president is Robert L. Noland (BS '41).



A process called 2-3 electrophoresis separates proteins according to their charge and mass. This allows individual proteins in a complex mixture to be identified. Aberrant proteins symptomatic of certain diseases can then be found and the disease diagnosed. Here Michael Harrington, senior research fellow in biology, and George Baklayan, research associate in biology, are involved in the separation process. They are part of one of five centers in the Division of Biology's Center for an Integrated Protein and Nucleic Acid Biotechnology.

Caltech winner in NSF competition

Continued from page 1

theoretical physics (computational science, applications, and high-level software). The Caltech component will be represented in the center administration by Dr. Keller.

The Center for Research on Parallel Computation will focus on the development of the next generation of supercomputers, which will depend on parallel processing—the breaking up of computations into smaller problems that can be more quickly solved by many small computers whose efforts are coordinated, or, in other words, concurrent. Extensive experience has proven that many important computing problems in science and engineering can be formulated very effectively using concurrent technology, but the expression of these computing problems will depend on developing new computational paradigms and programming methods.

The objective of the center will be to advance the science and technology of high-speed concurrent computation in an environment in which these advances are coupled to innovative and demand-

ing computing tasks in science and engineering.

At Caltech, the center will build on the accomplishments of Institute faculty in concurrent computer architectures, programming methods, solid-state device technology, algorithms, and applications; and on established connections with industry in the design and applications of concurrent computers.

An important goal of the center is to contribute in a major way to leadership in the United States in the development of the highest-speed computing systems and their applications to science and technology.

The center will address several inherent difficulties with parallel computation. For one thing, the computer programs for older, single-processor systems must be restructured to take advantage of parallel processing. The researchers will use their expertise in computer architecture, programming systems, computational mathematics, and scientific applications to make parallel-processing computers easier to use.

Caltech Centennial Year committee named

President Thomas E. Everhart has named a steering committee of Caltech faculty, staff, and alumni to begin planning for the Institute's Centennial Year celebration in 1991. Members are Sunney I. Chan (chairman), professor of chemical physics and biophysical chemistry; Theodore C. Combs (BS '27), alumni representative; David C. Elliot, professor of history, emeritus; Judith Goodstein, archivist; Gary A. Lorden, professor of mathematics; Robert L. O'Rourke, assistant vice president for public relations; and Jenny Bean, assistant to the vice president for Institute relations. The committee held its first meeting on December 14.

In issuing his invitation to the members, Everhart said the centennial would be an opportunity for Caltech to "convey some of our unique qualities to the world . . . and to reminisce and recall the great past we have inherited."

Wilde named master of student houses

Louis L. Wilde, professor of economics and executive officer for social sciences, has been appointed master of student houses, beginning at the start of the second term of the academic year. Wilde succeeds Robert Oliver, professor of economics, emeritus, who served as master in 1987-88, before his retirement. The Faculty Committee on Student Housing made a unanimous recommendation on Wilde to President Thomas E. Everhart earlier this year.

A Caltech faculty member since 1976, Wilde became professor in 1983 and was appointed executive officer in 1986. He received his BA in mathematics from the University of Iowa and his PhD in economics from the University of Rochester.

His research interests include the economics of imperfect information and uncertainty, law and economics, game theory, and tax compliance and the economics of law enforcement. He has been a Guggenheim Fellow (1983-84), a visiting professor at the Indian Statistical Institute (1984, 1987), and a Fellow of Yale Law School (1983-84).

Wilde has served as a member of the Faculty Committee on Curriculum and is currently a member of the Undergraduate Academic Standards and Honors Committee. He is the instructor for Caltech's rock-climbing class.

Caltech, Cornell to operate Hale Telescope

Caltech and Cornell University have signed an agreement for joint operation of the 200-inch Hale Telescope at Palomar Observatory. Under the agreement, Cornell astronomers will receive 25 percent of the observing time on the telescope in return for Cornell's providing one-fourth of the operating costs and constructing new detecting instruments for the telescope. Cornell's total contribution is expected to be about \$500,000 per year.

Under the agreement, Cornell astronomers will begin observing on the 200-inch telescope in January 1990. Cornell astronomers will receive their observing time spread over the entire year, including both light and dark phases of the moon. During the light phases, infrared observations that are unspoiled by moonlight are typically carried out, while deep-space optical studies of galaxies and quasars typically occur during the dark phase.

"This agreement assures that the Hale Telescope—among the greatest scientific instruments ever built—will remain at the forefront of science," said Caltech president Thomas E. Everhart. "It will help Caltech maintain Palomar Observatory as one of the premier observatories in the world."

The instruments that Cornell will provide for the Hale Telescope will consist initially of highly sensitive infrared detectors. Cornell astronomers, including Professor James Houck and Associate Professor Steven Beckwith, have led the way in developing infrared instruments for ground- and space-based telescopes.

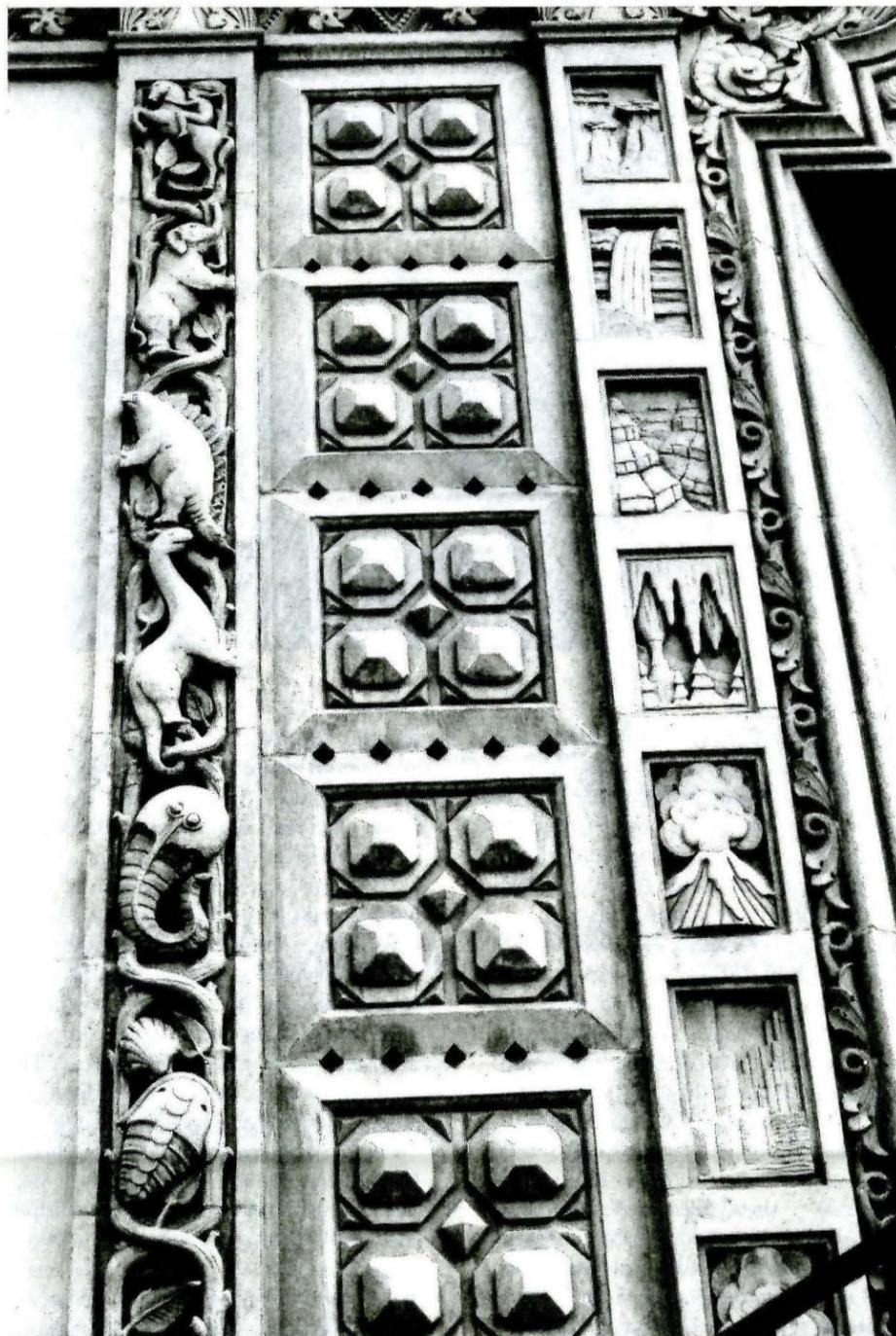
Caltech team places first in competition

For the fourth straight year, a Caltech team has placed first in the southern California regional competition of the ACM Scholastic Programming Contest. A Caltech team also placed second.

The first-place team is eligible to compete in the 1989 international competition, which will be held in February in Louisville, Kentucky. The team was the first in the regional contest to solve all six problems in the allotted six hours. The second-place team completed five problems.

Members of the first-place team are Myron Ahn, Ronald Goodman, Scott Hemphill, and Peter Wyckoff. Second-place team members are Jeffrey Jones, David Keir, Glenn Tesler, and Derek Wolverton. David Gillespie, who was a member of winning Caltech teams in 1986 and 1988, has used up his eligibility, but is coaching the teams this year.

More and more people are learning about Caltech architecture—thanks to CATS.



A detail of the Tree of Life carving on North Mudd Library.

Not many people know there's a sculpture of the Tree of Life on North Mudd Library . . . or that Beckman Auditorium may have been inspired by an Ethiopian temple . . . or that the iron window grills on the student houses are influenced by the architectural style of rural Andalusia.

But more and more people are learning to appreciate such details of the Caltech environment—thanks to CATS (the Caltech Architectural Tour Service), which came into existence three years ago and whose docents conduct tours of the campus from 11 a.m. to 12:30 p.m. on the fourth Thursday of every month.

CATS was formed by the Caltech Women's Club, with Romy Wyllie as its founder and chairman. The docents, who now number 12, got down to work to learn about the history and the architecture of the campus, and to prepare themselves to share that knowledge on a regular basis. Most are faculty wives; a few are staff members.

In addition to regular monthly tours (which have attracted as many as 40 people), the docents have given special tours for The Associates, alumni reunion groups, the Friends of Beckman Auditorium, and various groups in the community.

Their tour focuses on the old campus, which is bordered by California Boulevard and the former San Pasqual Street, and by Wilson and Hill Avenues—a portion that showcases the master plan of architect Bertram Goodhue. An original master plan had been developed by Myron Hunt and Elmer Grey, who created Throop Hall and Gates Hall, but George Ellery Hale saw Goodhue's work after he visited the buildings Goodhue had created at Balboa Park in San Diego, which Goodhue had designed to celebrate the completion of the Panama Canal.

Goodhue's "California Building" featured carved figures to depict the

Caltech's architectural environment

state's history, and a multicolored tiled dome inscribed with the words: "land of wheat & barley & vines, & fig trees, & pomegranates; a land of oil and honey." Hale found those images metaphors for the richness of intellectual work that would take place at Caltech, and, Wyllie explained, Hale wanted to surround members of the Caltech academic community with beauty so that their environment would expose them to the aesthetic values of life.

Goodhue designed the early end of the campus with a strong Spanish emphasis, and created a central square with arcades similar to those in Madrid and the San Juan Capistrano mission. Goodhue's intent was to "provide the atmosphere of scholarly calm and classic shade ever associated with the academic life," says Wyllie. He felt that an architectural style rooted in Spain was

most appropriate to a region originally settled by the Spanish and with a climate similar to its Mediterranean counterpart. And he succeeded to a remarkable degree, critics through the years have agreed.

The architect took a city plan as his model. Thus the exteriors of his buildings look somewhat consistent and stark, but inside they are very flexible and were designed to be adapted to the needs of the science being conducted there. The fronts open to a central axis broken by what are to be considered plazas, or city squares. The arcades provide grace and unity—as well as shelter and shade. Because the architect and the early campus leaders believed in integration of landscape and architecture, as many of the original oaks as possible were preserved and many remain today, surrounded by courtyards

or buildings.

CATS tour leaders point out architectural details often overlooked by casual passersby and cause many a tour participant to say, "I must have been walking around all this time with my eyes on the ground." The Tree of Life on North Mudd Library begins with an amoeba at the bottom, then displays a trilobite, an ostrocoderm, a brontosaurus, a stegosaurus, a mammoth, and, at the very top, a man on a horse. On one side of the tree, sculptures depict geological formations—volcanos, stalactites, and waterfalls.

Kerckhoff Laboratory is adorned with sculptures of cacti, jellyfish, squid, grapes, and monkeys—all of which have been used in studies of genetics. The influence of the Moors, who occupied Spain in the Middle Ages, also reveals itself in Goodhue's work. On the walls of the east and west Bridge building, Wyllie points out a geometric "diaper pattern," which resembles a honeycomb.

The Koran forbade the Moors to depict any human, animal, or other natural forms in their art, Wyllie explains, so they used many geometric patterns. Another place where the "diaper pattern" is found is on the walls of the Moorish Palace in Granada, Spain.

Sadly, Goodhue was personally only able to carry forth his master plan for a few years. He died in 1924, eight years and four buildings after his work at the Institute began. The Caltech trustees continued to work with his firm, Goodhue and Associates, for several years, and nine more buildings were completed according to the original scheme.

But working with a New York firm was difficult, and in 1930 the trustees decided to have a local architect, Gordon Kaufmann, take over. Never to be completed was the building Goodhue envisioned as the centerpiece of his

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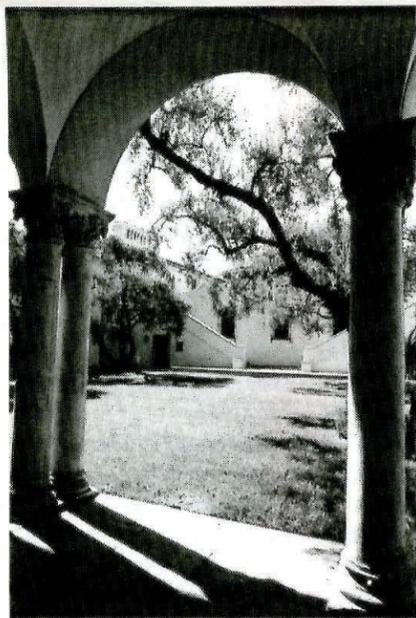
Caltech's architectural heritage

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plan—the memorial building with three reflecting pools on the west end of the campus, the whole inspired by the Taj Mahal.

Goodhue wrote in a letter to President Scherer dated December 9, 1916: "The central long court leading up to the Memorial Building . . . with its portals, rows of cypresses, garden and central pool of water, [has] something, though on a smaller scale, of the effect of the one leading to the Taj Mahal at Agra . . ."

Kaufmann retained the essence of Goodhue's plan, but with a softer, less rigid, and more residential feeling. He



A strong influence of rural Spanish Andalusia is evident in the original student houses.

introduced a strong influence of rural Spanish Andalusia, which shows in the whitewashed walls, iron window grills, and red tile roofs of the original student houses and the Athenaeum. Like the student houses, that campus jewel, the Athenaeum, is Mediterranean eclectic in its feel.

Although CATS does not take tour groups to the new portion of the campus north of San Pasqual, the docents talk about it and how it developed after the war. At that time, the idea of an overall plan disappeared along with the notion of using regional architecture. Buildings followed an international trend, using modern materials of steel, concrete, and glass rendered in architectural styles that could be applied anywhere. They became monuments to

Romy Wyllie with the domed porch of Kerckhoff Laboratory in the background.



people, or to a special need. Money was very tight, and the buildings strictly utilitarian. Wyllie believes that, for the first time, some of the original feeling of the early structures will be reintroduced with the new Beckman Institute, which features arcades and stone carvings.

The original campus followed an east-west axis and to that, with the creation of Beckman Auditorium, was added a north-south axis running from the auditorium to California Boulevard between Bridge and Sloan. A second north-south axis will be created upon completion of the new Beckman Institute, and will run from the Beckman Institute to the Calder Arches on the outside of the Arnold and Mabel Beckman Laboratory of Chemical Synthesis.

One of the most notable buildings on the new campus is Beckman Auditorium, created by the world-famous architect Edward Durrell Stone. Stone, a romantic, had traveled widely in the east, as had Goodhue, and the building is possibly inspired by an Ethiopian

temple. In his construction of the auditorium—which was originally intended only as a lecture hall—he made clear his belief that concrete can be a material of great refinement.

What about other colleges and universities? Have they succeeded in developing a master plan and sticking to it? "The evolution here is fairly typical of most colleges that started out with good strong plans but found them difficult to maintain," says Wyllie. "The difficulty in these times is in finding money for the buildings and getting donors to give with no strings attached. Most of the money, of course, must be put into the construction of the building itself. Often there isn't much left over for aesthetics."

In addition to the tours, Wyllie also presents an illustrated lecture about the campus for groups of any number. The lecture, entitled "The Story Behind Caltech's Early Architecture," uses dual slide projection to show buildings on campus alongside the great buildings of

the world that inspired them.

The docents continue to study the architecture and history of the campus on a regular basis, using resources in the archives and other material. They've found great rewards in their work. "The rewards," says Wyllie, "come in the satisfaction of sharing discoveries about the campus with an interested group of listeners and in doing a service for the Institute—and in the comradeship of participating in a very positive activity."

Geoffrey Blake awarded Packard Foundation grant

Geoffrey Blake (BS '86), assistant professor of cosmochemistry at Caltech, is among 20 outstanding young researchers nationwide to be named a recipient of the first David and Lucile Packard Fellowships in Science and Engineering from the David and Lucile Packard Foundation of Los Altos, California.

Under the terms of the fellowship, Blake will receive unrestricted research support of \$90,000 a year for the next five years. Caltech, as his home institution, will receive an additional \$10,000 annually in unrestricted funds, bringing the total award to \$500,000.

New superconductivity theory unveiled in single equation

Scientists at Caltech have proposed a theory that, in a single equation, attempts to predict the behavior of new superconducting materials and suggests an upper temperature limit for their superconducting properties.

Superconductivity is a phenomenon first observed in 1986. It allows materials to conduct electricity with no resistance at much warmer temperatures than had been observed in previous experiments.

The theory was developed by William A. Goddard III, Charles and Mary Ferkel Professor of Chemistry and Applied Physics, and graduate students Guanhua Chen, Yuejin Guo, and Jean-Marc Langlois. It was presented at the 196th American Chemical Society national meeting in Los Angeles.

Goddard says the theory is unique because it makes very specific predictions. It predicts that superconducting materials now being developed will have superconducting properties up to minus 54 degrees Fahrenheit, but no higher.

This would mean that superconducting materials could eventually be cooled

inexpensively with dry ice, rather than the liquid nitrogen that now has to be used.

But the upper limit would prohibit the development of room-temperature conductivity with the current generation of compounds and would make some proposed applications, such as superconducting power lines, extremely expensive, since some coolant would be required.

The theory was developed by studying the current generation of superconductors and discovering that they all had in common a particular arrangement of copper and oxygen atoms.

The theory predicts the critical room temperature, or the point below which a material will become superconducting, by relating it to the interaction of copper and oxygen atoms in the material. By acting as tiny magnets, the theory says, the copper atoms set up a situation in which positive charges are propelled between the oxygen atoms and the material becomes superconducting.

Superconductors traditionally have

been explained by the Bardeen-Cooper-Schrieffer, or BCS, theory, whose inventors were awarded a Nobel Prize in 1972. This theory describes how electrons, the carriers of electricity, glide unimpeded through superconductors when electron pairs form via unusual vibrations in the lattice of atoms that compose the materials.

Most scientists, however, feel that the BCS theory doesn't explain the new superconductors. They have been casting about for alternatives which might suggest how to improve the new materials for commercial applications.

Scientists agree that in the new superconductors, the particles that carry electricity are paired, as in the BCS theory. During the past year, most scientists have come to believe that the pairing involves magnetic phenomena rather than the lattice vibrations of the BCS theory. But crucial details of the magnetic mechanism have continued to be disputed.

*Caltech's
new director
of admissions
believes the
Institute is
too modest
about itself.*

By Winifred Veronda

Caltech's new director of admissions, Daniel Langdale, is enthusiastically implementing some new goals for the Institute's recruitment program. For example, he is intent on increasing the applicant pool from 1,600 to 2,500 and on boosting the percentage of women in the school population from 17 to 25 percent over the next five years.

Langdale arrived at the Institute last summer from MIT, where he had been associate director of admissions since 1977 and a member of the staff since 1966. As one used to looking at Caltech from the outside, he believes the opinion it holds of itself is too modest, and he intends to make sure that none of this undeserved modesty is passed along to potential students or their parents.

Caltech can offer enormous strength in all of the areas that are of major concern to potential students, he points out. In the areas of faculty, students, and physical plant he sees Caltech's stature as "Olympian."

"U.S. News and World Report [which ranked Caltech as the country's third-best university] merely confirmed that it offers one of the most energetic, able, intelligent, and enthusiastic faculties in the history of the world, and at the same moment, the opportunity to join a very able and energetic student body," Langdale says. "And then of course its physical plant is outstanding. In all of these attributes we're first-rate."

Added to these assets are "considerations of size," Langdale notes. "There aren't many universities with a smaller undergraduate body than ours—and perhaps none that is as small and vigorous."

Langdale throws in first-rate climate as another major plus. "I don't want to say that temperatures in the 60s and 70s in January and February are better than snow, but the climate here certainly offers students a fascinating alternative to attendance at many of the great universities in the northeast," he points out.

Finally, Langdale stresses, there is the advantage Caltech holds in its location immediately peripheral to a metropolitan area advanced by *The Atlantic* as "the city of the 21st century."

"Finance, technology, and business have all come to settle here, and the opportunity to be a part of that is not an inconsiderable aspect of being a student at Caltech," says Langdale. "A lot of students will finish their degrees here and end up as entrepreneurs, contributing some insight into an ongoing business or starting one themselves. And they'll do it right here in southern California."

To increase the applicant pool by a thousand or so, Langdale has to work

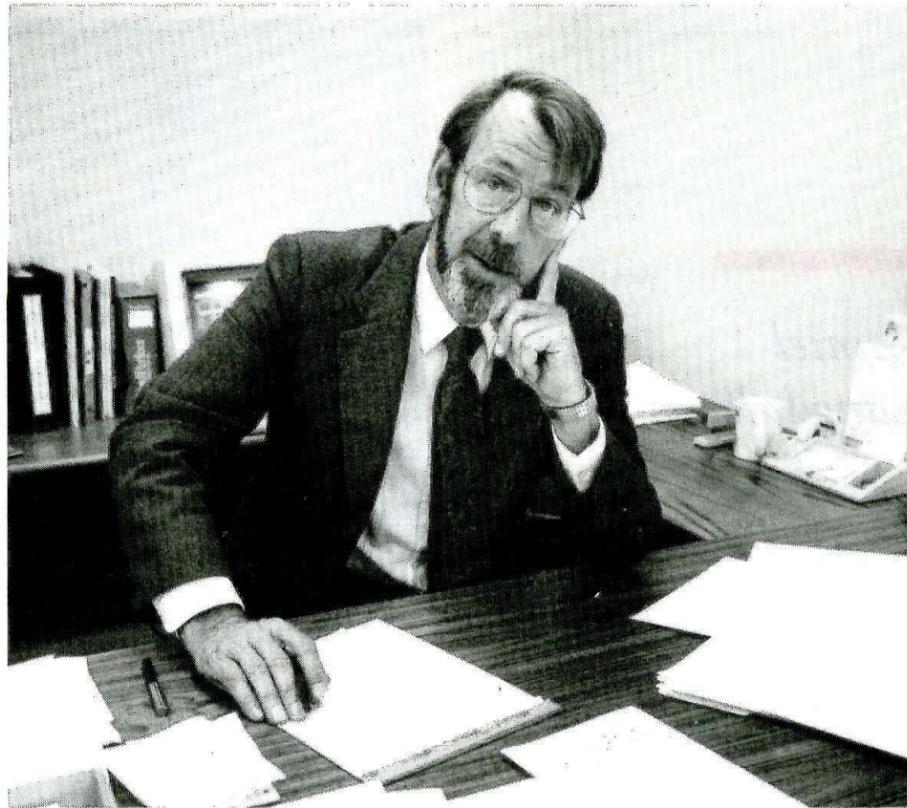
on discouraging some myths. One of these, he says, "is that every student at Caltech gets 800 on all standardized exams and has made straight A's from the first grade on. We deliver prospective students a somewhat more realistic version of the intellectual prowess of our candidate pool, and typically end up encouraging them to apply, because their profile is often more than adequate to the demands and expectations here.

"Another myth is that, given this aggregation of incredibly intelligent people, there isn't much of a social life. Candidates are often heartened to learn that we have an excellent athletic program, that there is opportunity for participation in drama and music and a wide variety of clubs. They often don't understand that Caltech requires a fourth of their undergraduate experience to be in the humanities and social sciences. They get a more full-fledged impression of what is, in fact, a major university. To some extent, we're compelled to broaden the impression that our name delivers."

Other misconceptions have to do with the number of women at the Institute, which Langdale says some candidates believe is perhaps closer to 6 than to 17 percent. "In fact, it doesn't surprise me," says Langdale, "to come across an occasional prospect among the young men who doesn't know that there are women here at all.

"In that respect, all of us involved in recruitment can deliver the confirmation that we're intensely interested in increasing the number of women here—as well as the number of underrepresented minorities."

Speaking of increasing the number of women, Langdale says, "I believe that women are aware of the kind of power and performance that Caltech engenders. They simply need encouragement to know that we want them here. It's my intention to do a more energetic job than we've perhaps done in the past in confirming for the nation's bright young women that we really do want them,



Dan Langdale

Selling Caltech's "Olympian" strengths

that there's a place here for them in science and engineering and the other majors we offer. We hope to double the number of women on campus within the next five years.

"The minority students also need to recognize that we want them here, and also that they can use Caltech as a bridge to contribute in a superior way to the advancement of civilization. The competition is going to be heavy because most of these bright minority students are being pursued by all of the nation's elite universities. We can't convince all of them that Caltech is the right place for them, but I think we can get many of them convinced of that, because I'm convinced and my intention is to share that conviction with them in a vigorous way."

Just what is Caltech looking for in its students? "Principally," says Langdale, "we're looking for young people who are intelligent, well-educated, willing to work hard, and fun to be around. The first three attributes are the ones that are anticipated. The last is the one that we don't spend a lot of time focusing on. 'Fun to be around' implies not only a well-developed enthusiasm for things of the intellect, but an equally energetic interest in other aspects of life—whether athletics or political activity, artistic endeavor, music, or theater: all the kinds of things that we all know lead to a balance in our lives that proves fruitful."

What about the image of Caltech as an institution with a larger than average number of "nerds" in the student body? Langdale views the "nerd" from a somewhat broadened perspective. "In my experience, this word tends to represent a young person who is somewhat more sincere than average in his or her approach to life, somewhat more aware of the massive problems facing civilization, and consequently less inclined to want to drink gin and wave a banner while watching a bunch of behemoths hammer each other around on a meadow," Langdale says. "This young

person is more inclined to take an interest in the challenges of modern technology, and in ways to use technology to gain an edge on the problems that could do us all in in the next 40 or 50 years. Consequently, many 17 year olds think that our kind of student is a 'nerd,' and someone who doesn't like to have what *they* call fun.

"Most of these more serious youngsters that I've known in the last 22 years were fascinating to me because of the depth of their knowledge about some interesting attributes of life, so I've always enjoyed their company. We're simply going to focus, as I believe we have in the past, on young people who have more than one dimension. Certainly my observation on campus during the last two months suggests to me that, to put it in the language of the parent of a graduate, 'we've got some really neat kids here.'"

In his efforts to bring the reality of Caltech to students, Langdale initiated a series of fall evening meetings, where students on the search list from the College Board were encouraged to bring their parents. He and the admissions staff traveled sometimes with faculty, and presented a slide show, made an oral presentation, and then opened the meeting to questions and answers.

About six meetings were held this fall as tests. "My personal experience is that they work," said Langdale. "For example, we had about 55 people at Georgetown Day High School, and I'm sure that those attending learned much more about Caltech than they knew before, and that we were able to alter some of the opinions they held that were not very well focused—the notion that only geniuses attend Caltech, for example."

In its fall efforts, the admissions office will utilize the help of alumni admissions representatives, as well as the

Continued on page 8

Daniel Langdale

Continued from page 7

faculty Admissions Committee and other faculty members.

During the spring, Langdale and his staff plan receptions around the country for students who have been admitted. "I really believe that Caltech is extraordinarily attractive, physically, intellectually, and socially, and that all we need to do is impress the reality of the place on the people we admit," he says. "Many of them will recognize that it's just their cup of tea, and they'll see that it's a superior alternative to the other schools that have admitted them. I'm afraid that there's some risk of students making their decision about where to go to school on inadequate information."

Langdale hopes that the spring term receptions, involving Caltech staff, faculty, and alumni, will lead these underinformed young people to conclude that Caltech represents a wise decision for them. He also plans some breakfasts with guidance counselors, and school visits during next fall's travel season.

Personal interviews of students by faculty members during the spring, long a Caltech tradition, have been eliminated under the new format. "We're going to focus more of our attention on constructing a folder of information that will allow two readers to form an adequate image of a young person. We feel we can confidently make decisions based on this material," says Langdale. "Over the years we had only been interviewing about half the class, and the process was becoming more and more unwieldy. Students were often making up their minds to go elsewhere before our interviewer got to see them. And our letters of admission were getting into students' hands weeks after those of other universities."

Langdale plans to mail admissions letters this spring on the 15th of March rather than the 10th of April, and, he says, "I believe students will respond better to that earlier mailing. It will give them more time to make up their minds and increase their informational store."

Despite the changes, Langdale insists that he's "not a revolutionary. The old engineering adage about not messing with a working ship has a lot of validity to it. I simply believe there are more than 1,600 kids who ought to be aimed in our direction, and I think we can do an excellent job of picking from an expanded pool of 2,000 to 2,500 applicants—many of whom will be female and more of whom will be Blacks, Hispanics, Puerto Ricans, and American Indians."

With these goals in mind, Langdale has a busy schedule ahead of him as he

helps Caltech cope with its own modesty, and works to attract those students that should be applying.

"Once they are challenged to think through Caltech's advantages, many of them are going to realize that it's precisely the kind of environment they'll thrive in," Langdale reiterates firmly. "Then they'll come here, and we'll all be glad."

CALTECH IN THE NEWS

In the world of physics, a "thought experiment" is the most exotic form of experiment—one that requires no equipment save one's brain cells, plus the courage to imagine the unimaginable.

A recent example is work by three physicists at the CALIFORNIA INSTITUTE OF TECHNOLOGY in Pasadena, who pose a seemingly preposterous question: Is it possible to build a machine that travels through time?

Their tentative answer: Maybe.

It might work if an advanced civilization could figure out how to travel through so-called "wormholes," which are infinitesimally tiny tunnels between different parts of the space-time continuum, according to an article in the September 26 *Physical Review Letters* by noted astrophysicist Kip Thorne and his colleagues, Michael Morris and Ulvi Yurtsever. *Cleveland Plain Dealer*, November 13.

Geologists say they have found the mysterious missing layers of the Earth's crust, solving one of the great geological puzzles and laying to rest the question of why the crust is so much thinner than comparable layers of Mars and the moon.

Don Anderson, professor of geophysics at the CALIFORNIA INSTITUTE OF TECHNOLOGY, said yesterday he and his team found the crust 250 to 400 miles beneath Earth's surface in a region of the planet's middle mantle, also known as the transition zone.

Anderson said the missing crust was found by using a highly sophisticated technique that allowed the scientists to determine the composition of the planet's middle region by studying Earth's deep vibrations or seismic waves. *San Diego Evening Tribune*, October 31.

That voice—if you heard Richard P. Feynman giving one of his world-famous physics lectures, or interrogating NASA witnesses after the space shuttle disaster, or telling stories from an armchair on public television, you might have been seduced by the unregenerate New York City accent, the gruff Art Carney delivery, the tones of charmed comic delight. Feynman's speaking voice echoes raw and direct through the printed pages of his surprisingly successful 1985 book of reminiscences, *Surely You're Joking, Mr. Feynman!*, and the same is true of its successor volume, with the equally gangly title, *What Do You Care What Other People Think?* *The New York Times* in a book review, November 13.

Twenty years ago, Carver Mead predicted the manufacture of silicon chips containing millions of transistors. Colleagues laughed, but Mead's theories became ground rules in the microchip explosion that followed.

Now the CALIFORNIA INSTITUTE OF TECHNOLOGY professor is promoting an even more outlandish notion: that a new kind of computer, inspired by the neurobiology of the human brain, will bring a revolution as profound as the emergence of today's digital systems.

"The brain is about 10 million times more efficient than the best digital technology we can imagine—not just what's available, but what we can imagine," Mead said in an interview. *San Francisco Chronicle*, November 15.

The Seaver Institute of Los Angeles has given CALTECH \$250,000 for

research on an autoimmune disease that will be conducted in the biology laboratory of Leroy Hood. The diseases, which include multiple sclerosis, rheumatoid arthritis, and myasthenia gravis, occur when the body's immune system attacks its own tissues. Hood said researchers are attempting to identify causes and to produce antibodies for the diseases. *Los Angeles Times*, November 13.

Creating competition may seem like a good policy for the Defense Department in contracting out defense systems, but it could increase costs and decrease efficiency, according to a CALTECH study released Wednesday.

"There are lots of theories consistent with what we're doing," said Charles Plott, a CALTECH economics and political science professor who conducted the study.

But Plott has developed "hard data" based on actual computer modeling of mock bidding on contracts. He hopes his study will be the first one published with this kind of data. *Pasadena Star-News*, December 1.

Three of the 11 science and technology centers created by the National Science Foundation are in California, an



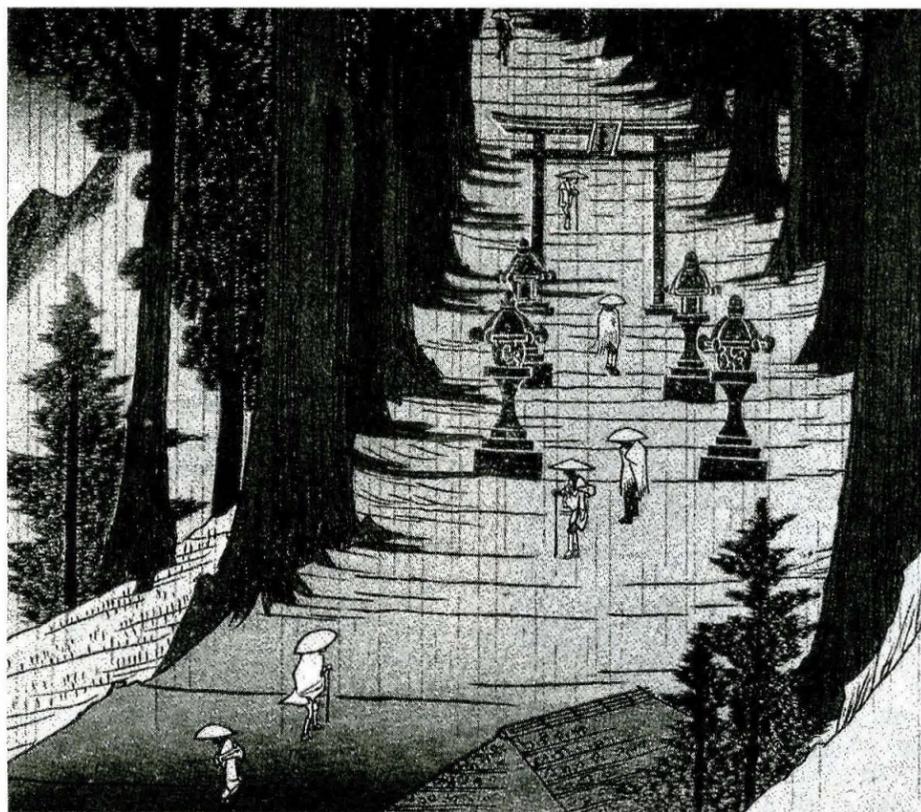
Charles Plott



Alex Santoso and David Cole compete in a Mechanical Engineering 72 design contest that involved building competing tug-of-war machines. Cole's machine, at center, was the winner in this encounter.

impressive recognition of the leading role played by scientists and engineers here The largest of the initial grants to California institutions will be \$3 million to CALTECH to establish the Center for the Development of an Integrated Protein and Nucleic Acid Biotechnology. It will seek to accelerate research in protein and gene regulation at the very foundation of life In addition, CALTECH will participate in a \$4.1 million program at the Center for Research on Parallel Computation being established under the federal program at Rice University. The center will seek means of getting faster supercomputing performance by facilitating parallel processing—breaking computations into smaller problems that subsystems can process in parallel. . . . CALTECH stands as an example of one of the greatest science and engineering institutions in the world—basically supported by significant government research funds. From an editorial in the *Los Angeles Times*, January 4.

Historian Robert Rosenstone chronicles the experiences of three Americans who sailed to Japan during the last third of the nineteenth century.



Detail from *boncho meisbo: Enshu Akibayama* by Hiroshige.

Back in 1975, Caltech Professor of History Robert Rosenstone returned from a year in Japan to find himself ill at ease with American culture. His cultural disorientation after a year of teaching in Japan led him to begin reading the journals, autobiographies, memoirs, and letters of 19th-century Americans who had lived and worked in Japan.

Rosenstone found that many of them had shared his perceptions of that country, even though they were there a century earlier. His search led him to write a book, *Mirror in the Shrine*, which describes the way impressions of Japan were filtered through the eyes of three very different Americans shortly after Perry opened up the country to Westerners in 1856.

Rosenstone chose for his subjects three people who kept diaries that reflected their own experiences. One was a missionary who went to convert the Japanese to Western religion, one was a scientist who went to convert the Japanese to Western science, and the third was a romantic writer who was in love with all things Japanese, and who had to learn what Japan truly was beyond its exotic aspects. Rosenstone himself is a minor character in the book, as he delves briefly into his own experiences.

Rosenstone's own insights into the impact of Japanese culture on the human psyche came after he had returned from a year of teaching as a Fulbright Scholar at Kyushu University in Fukuoka. He had lived in Spain and France, so life abroad was not new to him. "I experienced more culture shock on coming home from Japan than when I went there," he says. "This was a surprise to me. And I felt much more culture shock than I had when I returned from Spain or France.

"In Japanese society everything works well—transportation systems, urban systems. And whether you're buying something or having something fixed, the whole process takes place quickly and efficiently. All of these qualities that we prize in the United States are a reality there. Anyone who has hired a plumber here, or who has gone through a checkout line in the supermarket where the kids are talking to each other instead of attending to business, knows

The impact of Japan

By Winifred Veronda

that these qualities are not always a reality in this country.

"There was an attention to detail in Japan, and to the job at hand, and a social grace and politeness, that I didn't realize I had come to value so much in a year. Back home I was shocked by the brusqueness of American behavior, and by the harshness to one another in human relations. I was also taken aback by our assertiveness. The U.S. felt very alien to me. I had lived in southern California for 35 years, and it no longer felt as homey to me. The genesis of the book was to try to find out why.

"So I started reading biographies, autobiographies, books of letters, memoirs, all kinds of writings by other people who had gone to Japan. The largest group clustered in the 19th century, when a lot of Americans went there to work as advisers to the government or as teachers, and so on, when Japan began to modernize. At first I simply wanted to understand their experiences, but then I began to get interested in writing a book. I chose three whose diaries raised questions similar to my own. The fact that the same questions existed after a hundred years was both shocking and pleasing to me, because it showed cultural continuity.

"For example, I like walking and hiking. I like to walk for pleasure when I'm in a foreign country. Nineteenth-century Americans liked walking, too. The Japanese hate walking. They

understand hiking and mountain climbing as sports, but for a thousand years in Japan, walking was for the lower classes. The upper classes either rode horses or were carried on litters. I found that when I stayed with friends in the country I wanted to get out and walk around and see the countryside. They were shocked. Their reaction was 'Let's call a cab. Let's take a bus.' The same experience was replicated by the 19th-century Americans who were there. The Japanese were horrified that anyone would want to walk somewhere."

Another parallel emerged in interactions with the Japanese bureaucracy. "All three of my characters were teachers at one time or another," Rosenstone explains. "All of them found it was very difficult to get things done, and they couldn't understand why, but in Japan it's impolite to say 'no.' The Japanese will do almost anything to avoid a direct 'no,' but sometimes they can't say yes to whatever you're asking of them. So you encounter avoidance that keeps something from being done. To Americans this is maddening. They want to know. If it's 'no,' OK; if it's 'yes,' OK."

Rosenstone encountered an example of this type of cultural mind-set when he was teaching at Kyushu University. He decided he would have his class write a paper, rather than give them a final exam. He explained his decision to the head of the department, who said, "That's very interesting." Rosenstone thought the matter was settled,

but he was approached by the department head several more times with increasing insistence and was asked for his final exam questions, even though each time he carefully explained his plan for the written paper. He went ahead to require the paper, and then found that his colleagues wouldn't talk to him. He finally learned that, in breaking with a tradition of the university, he had called its whole educational system into question, and that the department head was afraid he had recommended to the Fulbright Commission not to give the university another scholar the next year.

"Eventually it all got straightened out," says Rosenstone, "but this is the kind of thing that can happen when you walk into someone else's cultural system without understanding it. The department head couldn't tell me I had to give a final exam, because then he would have been telling me I was wrong in the way I was teaching."

Like Rosenstone, the three characters in his book eventually came to see some of the world from a Japanese point of view, so that when they looked back at America they saw their own cultural norms, which they had taken for granted, in a whole new perspective. For example, by the end of three years in Japan, the missionary, William Elliot Griffis, who had come with the attitude that Buddhism was a pagan religion, was saying, "Buddhism contains many of the truths of Christianity—even though it doesn't have a savior."

The scientist, Edward S. Morse, whose whole interest when he went to Japan was focused on studying brachiopods, became one of the great collectors of Japanese folk art, transferring a consciousness having to do with collecting and classifying things of the natural world to this new cultural interest. He went on to write a book about Japanese architecture.

The writer, Lafcadio Hearn, stayed in Japan, married a Japanese woman, had four children, and died there. He wrote 10 books on Japan and its culture. "His whole process," says Rosenstone, "was one of coming to grips with the reality of the country and its imperfections after having idealized it through the elegance of its art and its writing. His books were filled with the wonders of Japan, but in his private writings he always complained about it—even though in his books he maintained that Japan was still the same immutably marvelous culture that he no longer believed in. In his experience, he stands athwart of the other two."

Rosenstone wonders whether there may be other cultures in Asia that
Continued on page 10

The impact of Japan

Continued from page 9

would have the same degree of impact on Americans, but he doubts it. For one thing, the Japanese culture combines contrasts to our way of life with values that are close to our own. "The Japanese seem totally different from us in some ways, but yet in other ways very much like us. This was true in the 19th century, and it is true in our own century," he says.

"To the 19th-century visitors, the Japanese seemed to be doing everything backwards, by our norms," he says. "We were individualists and they were group oriented. We were monotheists who believed in a single religion, and they had two religions—Buddhism and Shintoism, neither with a savior. A person might follow both of these, as well as Hinduism. We practiced a linear kind of thinking, they practiced a circular kind of thinking. Our language is very direct, theirs is very roundabout.

"But we could identify with many of their actions and their values—hard work, precision, organization, and systemization, for example. When they began to modernize, they quickly developed a national university system. They already had big trading companies, and banking. And while some people in the United States were still against smallpox vaccination, once the Japanese grasped the idea, the whole population was inoculated in a couple of years. They immediately did away with their folk medicine and adopted Western medicine, probably prematurely, because their folk medicine had value. But once they decided to do something they did it wholeheartedly, and that was very impressive to Westerners."

Rosenstone adds that Japan was very confusing to foreigners who came with a strong sense of cultural superiority, to bring civilization to the natives, and discovered that the natives were very civilized. One thing that amazed the visitors was the cleanliness of the Japanese. "The Japanese had been taking hot baths daily for 500 years. They were cleaner than the Americans, who were taking baths once a week in the 19th century. But to the Japanese a daily bath—up to 112 degrees—was a necessity," Rosenstone explains.

While doing his research, Rosenstone made a careful assessment of his own views about Japan. These enable him to offer insight into the rash of books that focus on the challenge of Japanese business techniques over the past 10 years. Rosenstone stresses that it is impossible to understand these successes by looking at such a short time span as a decade.

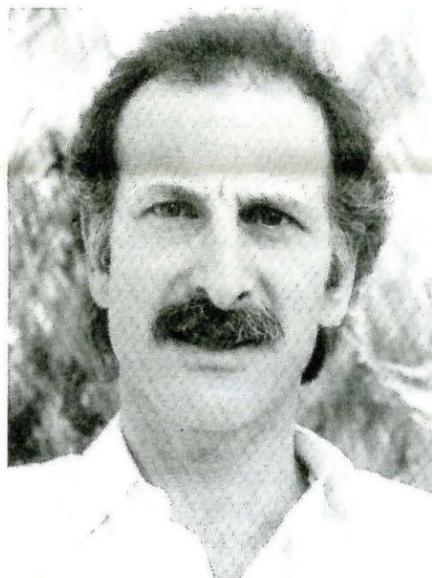
"The patterns that have contributed to Japan's successes haven't developed

over five or ten years," he says.

"They've developed over five or ten centuries. They come from the whole direction of the culture.

"There's no easy answer to why the Japanese are so successful in the business world. There are a lot of reasons. One is that theirs is a group-oriented culture rather than an individual-oriented culture. People are willing to sacrifice their emotional time, their working time, their family, for the larger group. That group used to be the feudal domain they belonged to. Now, that loyalty seems to have been transferred to the company—or to the idea of Japan itself being number one in the world. This ability to submerge the self in a larger whole is one of the things that makes Japan what it is today.

"I believe my book says that Japan as a culture may have lessons for us, but that they're lessons not easily learned. To succeed, we're going to have to do it



Robert Rosenstone

our own way, and not theirs, because their way is part of a 2,500-year-old cultural matrix that we can't reproduce. My message would be that when we get ourselves together and do what we do well, we don't have to worry about succeeding."

In *Mirror in the Shrine*, Rosenstone has written what he terms "an experimental book" in terms of its style of historical writing. It deals with "the subjective side of objective history. I've tried to write in a way that breaks the traditional mold of narrative history and uses some techniques for delivering the experience that are taken from novels and motion pictures. For example, there are a lot of direct quotes from the characters that I set in italics beside my words, which are in roman. This shows something about how the past and the present exist right alongside one another, and interpenetrate each other. The book attempts to render the full historical moment with an immediacy that I think very few historians have attempted before."

Today, most Americans would agree that Japan is a fascinating country. Rosenstone's book shows that the qualities that make it fascinating go back for thousands of years.

The flood: can its role be benevolent?

Throughout human history, torrential floods have periodically roared down river valleys, wreaking havoc on the people living below. But in some parts of the world, these floods have a beneficial aspect. In arid lands, particularly in Africa, tens of millions of people are dependent on the annual flood waters, relying on them for floodwater agriculture, for the grasslands that sustain their livestock during the height of the dry season, and for more productive fishing.

But the creation of huge dams in African river basins has cut off the annual flow of water to the lands below. Created to generate hydroelectric power for cities, the dams have caused severe hardship for the people living below them, exacerbating droughts and forcing many inhabitants to move to cities to look for new ways of earning a livelihood.

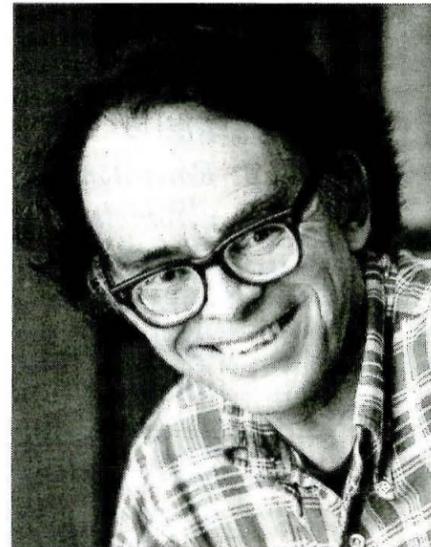
For 33 years, Caltech anthropologist Thayer Scudder has been studying the impact of large-scale Third World dams and irrigation projects on the people living below the projects and in the reservoir basins.

Now he is excited about the opportunity for analyzing a new option that can bring more benefits than costs to river line communities. The opportunity is presented by the recently completed Manantali Dam in Mali on the Senegal River. The option is to combine a dam-controlled downriver flood at the end of the rainy season, or during the early part of the dry season, and a synchronized reservoir drawdown with hydropower generation for both rural and urban consumers.

When Mali, Mauritania, and Senegal were discussing the nature of the Manantali Dam in the 1970s, it was pointed out that over 500,000 people living below the proposed project were dependent on the annual flood and that it would take at least 10 years to provide for them through construction of government-sponsored irrigation projects. As a result, it was agreed that a temporary flood would be released for the people's benefit during that 10-year period.

The Manantali Dam was completed during 1987, with the reservoir filling during the next 12 months. By then the international river basin authority (the OMVS) responsible for the dam's construction had run out of money to purchase turbines to generate hydroelectric power, while money for constructing irrigation projects was also in short supply.

As a result, interest has increased in using, at least temporarily, the stored waters for the benefit of the downriver people, and for the reforestation of what



Thayer Scudder

has become a battle line in the fight against the encroaching Sahara. The first release was this year, with about 50,000 hectares being inundated for the benefit of flood-recession farmers.

In 1985, the Institute for Development Anthropology (of which Scudder is a founding member) suggested to the U.S. Agency for International Development (AID), to the three African governments involved, and to the OMVS, that the Institute undertake a detailed assessment of the impacts of the controlled flooding.

Earlier this year, AID agreed to fund a three-year research project on the effects of the flooding, and three researchers from the Institute for Development Anthropology—one French, one American, and one Senegalese—are in the field studying the impact of the flood on the downriver people, and the extent to which their management of the water has increased productivity. In their work the researchers are collaborating closely with the International Union for the Conservation of Nature and Natural Resources—the world's largest international conservation organization, based in Gland, Switzerland.

The controlled flood offers a tremendous advantage over the traditional flood, which may be too large, too small, too early, or too late, and, in a particular year, may actually wipe out the people's agriculture.

"They're dependent on the flood, but at the same time it's the greatest constraint on their agricultural development," said Scudder. "There's a paradox involved in the whole situation.

"But with a big dam, the downriver flood can be regulated. The people can be told how much water is going to be released, when the release will begin, what areas are to be flooded, and for how many days. This tells them what crops they can grow. It enables them to practice more intensive agriculture. With this kind of information and the water management it allows, it's possible to significantly increase the economic security of these people, and to raise their living standards."

However, no one yet knows to what extent productivity can be increased through the flooding, and whether the young men and women who have begun moving to the cities will come back if the flooding enables them to boost their agricultural yields by factors of two or three.

"Our hypothesis," says Scudder, "is that they will come back, and that our

research will show that the economic benefits derived from increased production and higher living standards for the people—and the multiplier effects of those in terms of regional and national development—will far exceed the cost of the downriver flood. Therefore, we believe that such a flood should be considered a permanent feature of dam operation.”

In evaluating the possibility of creating such a flood on a regular basis, the researchers must take into account a reduction of electricity for the cities of perhaps 25 percent. “Our hypothesis is that the income, the jobs, and the economic development that will come from allocating 25 percent of the water for downstream development, are going to exceed the costs of reduced power generation by a significant degree,” says Scudder. “Furthermore, there will be opportunities for fisheries to develop, along with other ecological resources.

“This dam is in a region where the Sahara is encroaching, and the flood could play a major role in the recharge of aquifers—underground water supplies—which would make it easier to carry out reforestation and natural-resource management projects.”

Scudder points out that the experiment being monitored yields insight into the effects of a controlled flood and how people respond to it, not just in connection with the Senegal River project but for similar dam projects throughout the world.

“This makes it a very significant experiment,” he says.

For Scudder, the controlled downriver flood project offered pleasant contrasts to many studies in which he has participated. Often the consequences have been detrimental to the people involved. He is particularly noted for his long-term (since 1956) work on the impact of relocation on the Gwembe Tonga people of Zambia and Zimbabwe in the creation of the Kariba Dam in Africa.

Scudder has also concentrated on the developmental effects of such big dam projects as the Volta project in Ghana, the Aswân High Dam project in Egypt, the Mahaweli project in Sri Lanka, the Narmada Project in India, and the Three Gorges project in China. In such analyses he has observed the creation of much hardship for the people involved in the change.

In his research he has concentrated on projects in five river basins in Africa, Asia, and the Middle East. Through this work he endeavors to learn what the impact of these projects is on the people involved, and also how they respond to the difficulties and opportunities with which they are presented. He has used the data in these analyses as a base for examining the consequences of forced resettlement in other parts of the world.

Scudder has been using these river basins as a laboratory, he explains. “It isn’t possible to repeat the same experiment with the same population, but the same type of experiment is repeated in each river basin where a new dam is built. It is possible to see if the new

population responds in the same ways as the people affected by the other projects. We’ve found out that they do.”

Consequently, Scudder has been able to pioneer a theory of how people in rural areas respond to forced relocation, and he continues to test the theory by looking at new cases. In some of these, the results of his own research have been incorporated into the resettlement planning.

Now he is helping to pioneer a new kind of study—one in which a benevolent flood brings economic and personal benefit to the people whose lives it affects.

SPORTS



Cross Country

Both men’s and women’s cross country teams recently completed a highly successful season. For the first time, the women won more dual meets than the men by posting seven victories against eight losses. While the men won six and lost ten, this tenacious young team easily exceeded Coach Jim O’Brien’s wildest expectations. The top four runners from last year had either graduated or transferred, and this was expected to be a rebuilding year. However, with the continuing development of sophomores Chris Campo and Scott Kister, and the addition of talented freshmen Dan Flees and Mike Mahon, this team remained highly competitive.

In the SCIAC Conference, the men and women posted identical two-and-four records and finished in fifth place. Dan Flees led the men with a time of 27:56 over eight kilometers in the conference championship meet at Castaic Lake, finishing in 18th place and earning a spot on the all-conference second team. For the women, freshman sensation Jerri Martin ran a perfect tactical

race to claim third place in the conference for all-conference first team honors. Martin ran the five-kilometer course in 19:07, her best time of the season.

At the annual awards banquet, Scott Kister was recipient of the prestigious “Paul Barthel Award” for leadership, achievement, and sportsmanship. This award designates the team’s most valuable runner. Dan Flees received the “Outstanding Newcomer Award.” Flees, a freshman, led the team in half the races with Kister leading in the other half. It was a friendly rivalry which challenged both of them to perform at a higher level.

Sophomore runner Kurt Storm, who endured an injury-plagued season last year, came back to finish every race in the top seven; he earned the “Most Improved Award.” Team captain Chris Campo ran third for the team all season and never missed a practice. He was given the “Most Dedicated Athlete” trophy. Next year, this team loses only one senior, Ed Naranjo, from the top five scoring runners, and should get back on the winning track.

The “Outstanding Female Runner Award” went to Jerri Martin for her excellence throughout the whole season. Martin barely missed earning a trip to the NCAA nationals when she finished 16th at the Western Regional Meet while she was ill with the flu.

Women’s team captain, Bibi Jentoft-Nilsen is the only senior on the team and she was presented with a special “Four-Year Letter Award” which focused on her consistent high-level performance throughout her four years on the team. With her enthusiasm and leadership, she will be hard to replace. Margi Pollack received the “Most Improved Award” and ran a strong second on the team all year. Freshman Mary Rowe received the “Most Dedicated Award” for her diligence at a sport in which she had never before been a participant. Rowe was the team’s sixth runner. The “Outstanding Newcomer Award” was presented to Emmeline Naranjo for steadily dropping her times week after week. Naranjo, a freshman, had prior experience in track as a hurdler but this was her first attempt at distance running.

Occidental College won both the men’s and women’s conference championships. Claremont was a distant second in both races. The future for Caltech’s teams looks very good indeed with an infusion of talented young runners who will only get better.



Football

The 1988 Battling Beaver football team played a real international schedule this year as team members pounded out victories over teams from four different nations. First on the list was the Australian National Team. On a world tour, the “Kookaburras” fell 26 to 13 on a cool evening at Banning High School. The British Bulldogs from London next tried to pull off a victory over the Techers, only to surrender 22-6. CETYS, or Centro de Enseñanza Técnica Y Superior, provided a third opponent from outside the United States border to contest the home team. The “Zorros” were defeated 29-12. Overall, the football team concluded the season with a 7-1 record.

The Battling Beavers were ranked as high as third nationally in the weekly National Collegiate Football Association poll. (Note: MIT joined the NCAA Division III only to post a winless season.) Western states radio station KDWN from Las Vegas featured an hour-long interview, with head coach Lin Parker talking to sports personality Harvey Hyde.

The Beavers continued their dominance over the Pasadena Police Officers’ Association with a 39-6 win featuring an opening-drive touchdown by Jimmy Moore, who returned to play Caltech football 12 years after he graduated. The team closed with a rush, winning the final five games in succession. The Cal Poly Broncos fell before the Beavers, 16-7, and this win was especially sweet, considering Cal Poly’s student enrollment of 18,000.

Of the 61 men who began double-day practices in September, 49 celebrated at the Caltech Alumni House at the annual Awards Dinner. Page House senior Dwight Berg received a three-year letter award which includes a lifetime pass to all Caltech athletic contests. “Rookie of the Year” went to newcomer Mike Whitney, who led the team in rushing yardage. The “Best Defender” award was handed to hard-hitting veteran Don Ernesto Thomas. The “Battling Beaver” award for exemplary spirit was given to astronomer Blaise Canzian while the “Most Improved Player” accolades were received by Hector Chavez for his stellar play in the team’s goal-line defense.

The “Irv Noren Trophy” for outstanding back was awarded to Vincent “Big Play” Riley, and the “Max West Trophy” for outstanding line play was voted to Scott Miskovich. Don Thomas received the coveted “Wheaton Trophy” for leadership and all-around excellence.

Elsewhere in the Southern California Intercollegiate Athletic Conference, Occidental was the league champion.



Soccer

The 1988 soccer season was somewhat disappointing for Caltech, considering the team's talent. The overall record was 3-13. The highlight of the season was a 6-0 victory over the University of Redlands—Redlands' worst defeat of the year. (The first game against Redlands was a 6-5 loss in a game noted for less than spectacular defense.) The team also played very well against Whittier, losing both games in overtime.

Throughout the season, the team suffered from the lack of an established goalkeeper. A number of outfield players tackled the goalkeeping position. Ben Funk, a regular fullback, finally settled in as goalkeeper toward the end of the season and did very well. He will be back next year, and Coach Don Cameron is sure Funk is hoping that some aspiring goalkeeper makes his way to Caltech by the new season.

A number of players were honored at the end of the season. Flavio Noca was chosen all-conference first team. John Josephson was second-team all-conference, and James Ibbetson was chosen by his teammates as the "Most Valuable Player." Oscar Duran was selected by the coaches as the "Most Improved Player."

This year's captain, John Josephson, distinguished himself during his four years at Caltech, playing in every game while he was a student. In spite of the loss of seniors Josephson, Jeff Flint, Randy Bownds, Alan Kwentus, Tom Tetzlaff, Wolfgang Hofmann, Paul Searcy, and Oscar Duran, there is a good nucleus of players for next year.

Coach Cameron and Coach Mike McCallan have decided to retire after 17 years of coaching at Caltech. They would like to thank all of the players who contributed to Caltech soccer during those years. They both observed how much quicker players have become over the years.

The coaches' selection of an all-Caltech team for the past 17 years is as follows: Van Eric Stein, goalie (BS '88), John Rogers (BS '72), Bruce Baker (BS '78), Mike Keating, (BS '88), Manuel Acevedo (BS '85), John McNally (BS '82), John Dilles (BS '76), Peter Orr (BS '83), John Kriebel (BS '84), Konstantin Othmer (BS '88), and John Josephson (BS '89).



Volleyball

The Caltech women's volleyball club team benefited this year from a large squad of players. Nine returning team members were joined by five new recruits, including two freshmen. Laurianne Williams returned to coach for the fourth year, assisted by Rob Nickells, a research fellow in biology.

The volleyball team started out the season slowly, losing seven straight matches, including a heartbreaker to Occidental that went the full five games. Then everything seemed to come together, and the women won three straight matches. At home, they defeated Mount St. Mary's College and Barstow College, both in three straight games. In between, they travelled to Loma Linda University and won a close fifth game to take the match. However, injuries and midterms started to take their toll at this point, and Caltech lost the last four games of the season, bringing its record to 3—11.

A plethora of conflicting schedules and other commitments among the players frequently left the team short-handed at away games, forcing Coach Williams to rely upon the team's depth to assemble starting lineups. Middle blockers team included, at various times, senior Karen Oegema, graduate students Christine Wilson and Hsiaolan Hsu, and post-doc Courtney Smith. Setting duties were rotated among Linda Rowan and Lynn Hildemann, graduate students, and Carol Mayeda, staff. Power hitters included graduate students Julianne Moses and Lorraine Hwang, along with senior Carol Mullenax. Senior Carol Choy rotated as an ace server and defensive specialist, while senior Betty Andrews filled in frequently as a utility player.

The Caltech women had one of their best seasons in many years in terms of serving and spike blocking. However, they continued to be inconsistent on serve-receive and on handling dinks; they played quite well sometimes and badly at other times. The team fared especially poorly at two games scheduled early on Saturdays, presumably because of widespread somnolence among the players.

At least five members of this year's team will be graduating, so many changes are anticipated for next year.

Water Polo

The 1988 season turned out to be more of a rebuilding year than was anticipated. Four starters from last year were lost due to graduation—a serious blow. Then, early in the season, two seniors and one junior had to quit the team for personal reasons. After that, team captain Devin Leonard took a job that made it impossible for him to play. This left a team made up primarily of inexperienced sophomores and freshmen. They took their lumps, but the experience gained by these young players should pay off in the future. Next year Tech will be fielding a starting lineup that has played together as a unit for the whole season.

This year, the Beavers were winless, but the improvement of the squad could easily be seen. The Techers began to stagger under the force of the competition at a much more reasonable level near the end of the season.

The only returning player who started a few games last year was sophomore Brian Shim. He teamed up with freshman Tamaki Murakami. Both young men did an outstanding job, drawing kickouts and scoring goals. They should provide a quick one-two punch for the next two years.

Setting the hole position, the team used a three-man combo of sophomores—high scorers David Geraghty, Graham Gitlin, and David Amezcua. The mid-tank play was controlled by senior Jordan Holt, and juniors Mark Hause and Ted Rogers. The goal was handled by senior Tim Hockberg, who didn't get much playing time last year. Doruk Engin started on this year's squad and was third leading scorer; he was also one of the frosh leaders. The talented group of freshmen consisted of Lee Burrows, Chris Daugbjerg, Jerry Carter, Tim Maddux, Karin Johnson, Grant Sitton, and Mateo Vazquez.

In conference play, Claremont took this year's crown. Brian Shim impressed the other coaches to make the all-SCIAC team, honorable mention. Shim was also voted to receive the "Coach's Cup" trophy and will be team captain next year. David Geraghty received the "Most Improved Player" award, while Tamaki Murakami won the "Outstanding Freshman" award.

Next year, Caltech will have a core of returning starters, and the team will be strengthened by the return of Devin Leonard, back along with Boyd Bangerter. Bangerter was a starter two years ago before taking a leave. With those two standouts returning, and another strong freshman group coming in, the water polo team should be looking forward to a lot of success.

Wrestling

The Caltech wrestling team ended its 1988 season with a tournament at Cal Poly San Luis Obispo on November 12. This year, returning juniors Manuel Aranda and Gordon Pioreschi recruited juniors Kahn Lim and Jong Kim. They were joined by freshmen Albert Ho and Shane Sauby. Freshmen Matt Fetterman and Tal Schwartz attended the last two weeks of practice.

Until 1985, wrestling had been a SCIAC sport. After the other schools in Tech's league dropped wrestling, Caltech was left as the only Division III school in California with a wrestling team. Subsequently, the athletic department decided to move wrestling from the winter to the fall so that Tech could compete with junior colleges instead of with Division I and II universities. This proved to be a good choice. The team can now schedule a reasonable number of matches and tournaments at a fair level of competition. Lin Parker, who coached the wrestling team until 1986, sets up the schedule, while Tim Cotter, a senior, and graduate student Sean Tavtigan share the coaching.

This year the team participated in four tournaments, one three-way meet, and two dual meets. The most enjoyable meet of the year was a freestyle tournament at Santana High School, near San Diego. By virtue of his age, Albert Ho slipped into the high school division where he won his first match. Pioreschi was saluted four times in two matches, a difficult introduction to the difference between collegiate and freestyle wrestling.

Throughout the season Aranda put in a solid performance at 142 pounds, winning his match in the dual meet against Rio Hondo, and consistently keeping the score close in the rest of his matches. Ho looked good at 118 pounds, especially when he scored the first takedown against a 118-pound opponent from Cal State Bakersfield, but eventually moved up to 126 pounds where he found the competition much tougher.

Pioreschi finally made it all the way through a match against San Diego City College. And even when our wrestlers were not competitive due to lack of experience, steady improvement during the season in both technical proficiency and physical conditioning made all of the pain and suffering worthwhile.

Next year's team should be considerably more experienced than this year's team. With the addition of a few freshmen, all of the weight classes may be filled. Who knows, maybe the team will even schedule a home meet!

ALUMNI



Alumni Activities

Feb. 9–24, Antarctica travel program, cosponsored by the Caltech and Harvard Alumni Associations. Barclay Kamb, vice president and provost, and professor of geology and geophysics, will accompany the trip.

April 30–May 5, Washington, D.C., travel program.

May 5, Reunion, class of 1979, in the Athenaeum.

May 6, Reunions, classes of 1944, 1949, and 1984, in the Athenaeum.

May 19, Reunion, class of 1964, in the Athenaeum. *Reunion, class of 1954,* location to be decided.

May 20, 52nd annual Seminar Day, on the campus.

June 3–4, Reunion, class of 1939. Reunion activities to be determined.

June 3, Half Century Club luncheon, in the Athenaeum.

June 22, Alumni Association annual meeting and honorary alumni dinner, in the Athenaeum.

June 23–July 2, Alaska travel program, with Robert P. Sharp, Sharp Professor of Geology, Emeritus, and Leon T. Silver, W. M. Keck Foundation Professor for Resource Geology.

Oct. 8, "Phantom of the Opera," Ahmanson Theatre.

For more information about any of these programs, please contact the alumni office: Caltech Alumni Association, Mail Code 1-97, Caltech, Pasadena, California 91125, 818/356-6592.

From the alumni president

As the Alumni Association year progresses, our programs have been enthusiastically received by alumni. A recent example was the annual holiday open house in December at the Alumni House; the event was attended by approximately 325 faculty, students, alumni and staff—the largest crowd ever to attend!

Progress continues on many different Association activities. Plans are completed for the alumni travel opportunity to Washington, D.C. in April. A detailed article appeared in the December *Caltech News*. The trip offers a unique opportunity to explore the nation's capitol.

Chapters around the country are growing, as evidenced by a meeting in Orange County on January 30, where President Thomas E. Everhart addressed alumni and guests. It is hoped that the interest stimulated by this event will lead to the formation of a new chapter in Orange County.

Based on feedback from questionnaires sent to alumni in five classes, the Reunion Review Committee has scheduled two additional reunions this spring—for the classes of 1949 and 1969. (Please see the article in this issue for details about all the reunions being held this year.)

As part of my ongoing effort to introduce the Association committees and chairmen to you, I would like to focus this month on the Seminar and Publications Committees. The Seminar Committee, with Franklin D. Dryden (BS '54) as chairman, is planning the program for the 52nd annual Alumni Seminar Day, scheduled for Saturday, May 20. Under Dryden's direction, members of this committee meet with division chairmen and faculty to identify



speakers currently involved in exciting research at Caltech and JPL. These speakers will cover a wide variety of topics in science, engineering, and the humanities and social sciences. In addition to the faculty lectures, Summer Undergraduate Research Fellowship (SURF) students will describe the research they were involved in last summer. The committee has also arranged exhibits and demonstrations to add another dimension for Seminar Day participants.

Simon Ramo (PhD '36), director of TRW Inc., emeritus, and Caltech life trustee, will be this year's general session speaker. Another session will feature

the presentation of the Distinguished Alumni Awards. These awards, first given in 1966, are the highest honors bestowed by the Institute. Caltech presents them to graduates who have distinguished themselves professionally in their field or through service to the community. Out of 16,500 alumni, only 115 have received this honor.

Mark May 20 on your calendar and plan to attend an exciting, informative Seminar Day!

The Publications Committee reviews and directs the production of Alumni Association publications, including the Alumni Directory, *Engineering & Science (E&S)*, *Caltech News*, and specialty publications such as *Legends of Caltech*,



Charles H. Holland, Jr.

which chronicles famous pranks by Caltech students. This committee, chaired and guided for the past three years by William M. Whitney (BS '51), has worked hard to improve the image and quality of these publications.

In close association with the Public Relations Department, the committee has generated advertising for *E&S*, and has encouraged qualified alumni contributions to the magazine.

The committee was also responsible for the 1988 Alumni Directory, the first not produced in-house. Committee members supervised the selection of the Harris Publishing Company to produce the directory, and worked with them in conceiving its attractive new format. Members also monitored its distribution to all Association members. Preliminary discussions are already underway for the 1992 directory!

The Alumni Association thrives because of hard-working committees like the two described above. We are indebted to them for their efforts.

We appreciate feedback from alumni concerning any Association issue. Please contact us by mail or phone:

CALTECH ALUMNI ASSOCIATION,
MAIL CODE 1-97, CALTECH,
PASADENA, CALIFORNIA 91125,
818/356-6592.

More about Legends of Caltech, Volume II

Progress continues on *Legends of Caltech, Volume II*. Authors Adrian C. (Chip) Smith (BS '70), Harrison Sigworth (BS '44), Reuben Moulton (BS '57) and Willard Dodge (BS '44) have identified enough good material to assure alumni and friends that a second volume will be published. However, there's still room for more! The editors are especially looking for material for a section called "The Beat Goes On"—stories of pranks Caltech alumni have played on one another since graduation. They are continuing to receive tales of clever escapades on campus.

One such story is about a finesse stack from a recent Ditch Day. A senior left his room guarded by a computer for the day. On the computer screen was a message: "The computer will open the door." The students tried in vain to open the door to the room, entering every instruction they could think of on the computer. The senior returned to find that the students had not been successful. The computer had been programmed by the senior to automatically open the door if the keyboard were left alone for five minutes!

This is the last call for contributions of unusual and original stories about Caltech pranks. Please send material, along with photographs or drawings, to Chip Smith, Lawrence Livermore National Laboratory, Box 808/L-626, Livermore, California 94550. Deadline for all submissions is March 12.

Caltech student named Rhodes Scholar

Gregory P. Dubois, a doctoral candidate in high-energy physics, has been named a Rhodes Scholar. He will study at Oxford University in Oxford, England on a two-year postdoctoral fellowship, focusing on the interaction of science, technology, and public policy. Dubois entered New College of the University of South Florida at the age of 12. He is one of 32 U.S. college students to be selected as Rhodes Scholars this year. He will enter Oxford in the fall.

The scholarships were established in 1902 by the estate of Cecil Rhodes, a British philanthropist and colonialist. Among the criteria for selection are: intellectual and academic excellence, integrity, respect for others, and the ability to lead and to use one's talents fully. A student also must be 18 to 24 years old and single.

ALUMNI

Reunions announced for spring 1989

Caltech reunions provide an excellent opportunity for alumni to renew friendships and reacquaint themselves with the campus. Several classes, listed below, will celebrate reunions this spring. Mark the date and watch the mail for details and registration information. Join your friends and make this a *special reunion*.

This year the Reunion Review Committee sent questionnaires to several classes not originally included in this year's reunion scheduling, to determine the interest of the class members in holding a reunion this spring. As a result, two additional reunions, for the classes of 1949 and 1984, have been added to the five originally scheduled (1939, 1944, 1954, 1964, and 1979). The reunion dates and committee chairs for the spring reunions are listed below.

Friday, May 5, Class of 1979, in the Athenaeum. Stan Cohen, reunion chair.

Saturday, May 6, Class of 1944, in the Athenaeum. Harry Sigworth, reunion chair. **Class of 1949**, in the Athenaeum. Joseph Dobrowolski, reunion chair. **Class of 1984**, in the Athenaeum. Debbie Mathews and Reed Burkhardt, co-chairs.

Friday, May 19, Class of 1954, location to be decided. Sam Vodopia, reunion chair. (Note: This reunion date has been changed from May 6.) **Class of 1964**, in the Athenaeum. David Holtz, reunion chair.

Saturday, June 3, Half Century Club luncheon in the Athenaeum, inducting the class of 1939.

Saturday, June 3 and 4, Class of 1939 reunion activities to be decided. Herb Strong and Ray Gerhart, co-chairs.

Many alumni have indicated an interest in attending reunions of classes other than their graduation year. The Alumni Association can designate a

"preferred year" in your file and send you information about reunions for that year in addition to the year you graduated. If you would like to receive reunion information for an additional year on a regular basis, please fill out the coupon below and send it to the Caltech Alumni Association, Mail Code 1-97, Caltech, Pasadena, California 91125.

"Day on the Job" and summer job programs expand

For the fourth successful year, the Alumni Association and the Career Development Center are coordinating a summer work experience program for Caltech students. The work experience helps the student explore a career interest and provides summer income.

This program has proven extremely valuable to both the students and the companies that have hired them. It provides companies with a pool of talented, well-trained, summer-job prospects, and gives students both experience and income.

Alumni in the greater Los Angeles area can also participate in the "Day on the Job" program, which provides students with exposure to the actual work environment in career areas of interest. A student spends the day with a Caltech alumnus at the alumnus's plant or company. Many students have chosen a career based on the insight gained from one of these visits.

The Student/Faculty/Alumni Relations Committee and the Chapter Affairs Committee of the Alumni Association are working in concert with the Caltech

Career Development Center to make these programs successful. Your help is needed!

If you would like to receive more information or think you might be interested in offering a summer work experience to a Caltech student, please contact Rosana Gatti, Career Development Center, Mail Code 8-31, Pasadena, California 91125, 818/356-6361.

Alumni Association bylaws amendment

The Caltech Alumni Association bylaws, section 2.08, annual meetings, has been amended as follows: The first sentence, "The annual meeting of members shall be held on the third Thursday in June of each year, at a time to be designated by the Board," has been amended to read "The annual meeting of members shall be held in June of each year on a date and time to be designated by the Board."

The section continues, "At the annual meeting, the results of the election of Directors and Officers pursuant to Section 5.02 shall be announced, reports on affairs of the Association shall be considered, including the annual report of the President, and any other proper business may be transacted."

The Board, at its November meeting, voted to hold the 1989 annual meeting on **Thursday, June 22**, in the Athenaeum.

OBITUARIES

1922

HAROLD R. HARRIS, of Falmouth, Massachusetts, on July 28. A Life Member of Caltech's Alumni Association, he is survived by his daughter, Alta Mae Stevens.

1927

RICHARD C. DATIN, of Laguna Hills, California, on October 6. He is survived by his wife, Mary.

1930

HERBERT H. DEARDORFF, of Sacramento, California, on December 12, 1986. A Life Member of the Institute's Alumni Association, he is survived by his son, Herbert.

HARRIS K. MAUZY, of Sacramento, California, on September 21, of congestive heart trouble. He is survived by his daughter, Kay Henderson.

FREDERICK T. SWIFT, of Glendale, California, on October 29, after a long struggle with cancer. He is survived by his daughter, Nancy Chubbuck.

1931

NELSON M. CORDES, of Laguna Hills, California, on May 7. He is survived by his daughter, Ann Cordes Lynch.

1934

H. THOMAS HOLTOM, MS '35, of San Gabriel, California, on August 31. Born in 1911 in Kariuzawa, Japan, of missionary parents, he was educated at the American School of Japan, the University of Redlands, and Caltech. He worked as a civil engineer for many years, and was a Fellow of the ASCE and the IAE, as well as a Life Member of Caltech's Alumni Association. He is survived by his wife, Olive; sons, Gordon and H. Thomas; daughter, Katherine Jones; grandsons, Evan and Leonard Jones; daughter-in-law, Mary Anne; and son-in-law, Noel D. Jones.

DAVIS A. SKINNER, MS '36, of Fullerton, California, in the summer of 1988. He is survived by his wife.

1935

ELMER L. LEPPERT, JR., MS '36, of Glendale, California, on October 24, 1987, of Alzheimer's disease. A Life Member of the Institute's Alumni Association, he was retired from JPL. He is survived by his wife, June.

1937

JOHN B. HATCHER, MS '38, PhD '52, of Minneapolis, Minnesota, on August 15. He is survived by his wife, Evelyn.

1941

JOHN J. PAULSON, of Pasadena, California, on September 19. Upon retiring from JPL after 35 years of service, he devoted his time to the Pasadena YMCA and was a docent at the L.A. Zoo. A Life Member of Caltech's Alumni Association, he is survived by his son, John; daughter, Karla P. McIntyre; mother-in-law, Hazel S. Gutwein; brothers, Walter and Peter; and sisters, Louise, Caroline, and Josephine.

CALTECH ALUMNI ASSOCIATION

Preferred Year Designation

Name (please print) _____

Graduation Year from Caltech _____

Preferred Year _____

Current Mailing Address _____

Mail to: Caltech Alumni Association, Mail Code 1-97, Pasadena, CA 91125. You will receive reunion information about the class indicated as a preferred year.

PERSONALS

1929

THOMAS EVANS, MS '30, of Lake San Marcos, California, was honored recently by the Pacific SW Section of the American Society for Engineering Education for having been a member of the national organization for over 50 years. Evans retired as Dean of Engineering at Fresno State University in 1973. Prior to that he had been dean at Georgia Tech and then at Colorado State University. On leave in 1959, he headed an international group to start the Asian Institute of Technology in Bangkok and served as its first dean.

1932

HAROLD ROACH, MS '33, writes from his home in Beverly Hills that he continues to create works of art, as he has for the last 35 years. In addition to his art, Roach has enjoyed a long career in designing and building chemical and other industrial plants. He also has done work in psychology, serving 15 years as a volunteer in a Los Angeles school for mentally retarded children, a school he designed and built, partially funded, and helped to operate. He has published two books of poetry, and is now writing some children's books of humor. Reflecting on his student days at Caltech, Roach writes, "I was very fortunate in my stay at Caltech to be guided by some of the finest men of our times—Professors Judy, Beckman, Millikan, Fogg, and many others—who not only educated me, but encouraged me to never stop learning, and were primarily responsible for the wonderful life I've had."

1939

KEATS A. PULLEN, JR., of Kingsville, Maryland, has been chosen to head the Aberdeen Proving Ground chapter of the Armed Forces Communications and Electronics Association for the coming year. Among his responsibilities will be the selection of speakers for the group's meetings.

1941

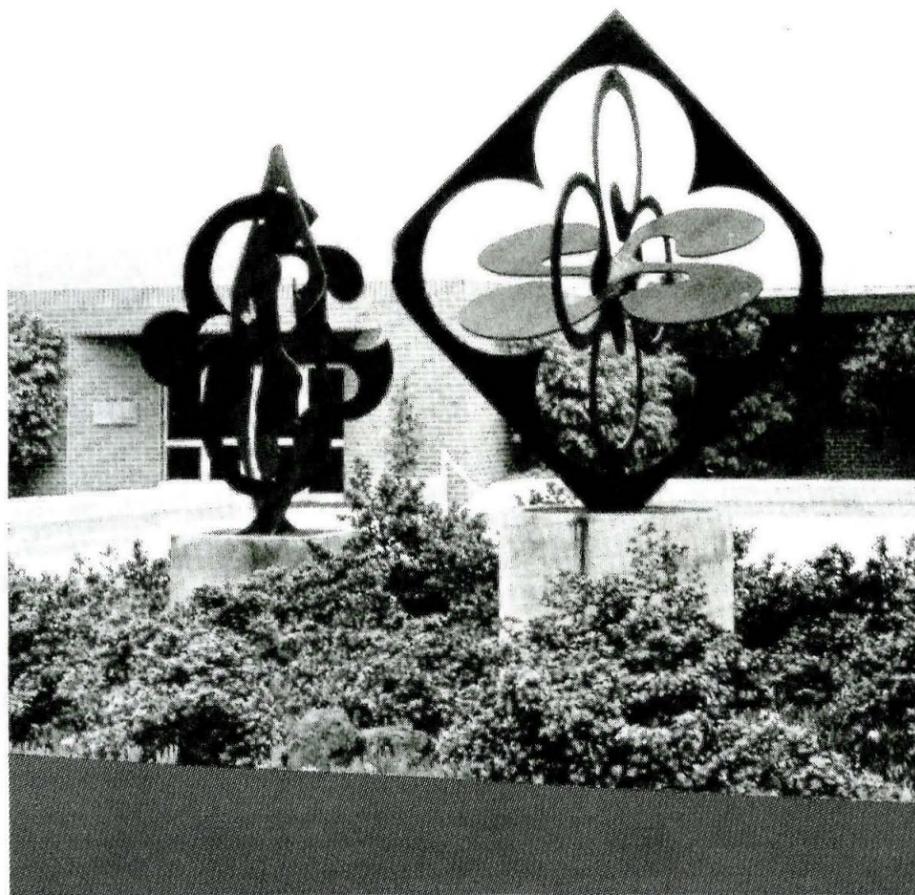
EMERSON H. LABOMBARD, of Los Angeles, has retired from Douglas Aircraft—after 45 years of employment there. His energies are now focused on the Solar Sail Project of the World Space Foundation, for which he serves as director.

1942

EDWARD R. BARTLETT, JR., MS '47, of Mansfield, Ohio, has recently retired. He is now teaching math part time at Ohio State Reformatory in an Ashland College degree-credit program for inmates. Bartlett writes that his son is studying at UCSB, pursuing his doctorate in materials science.

1949

EMMETT MONROE, MS, was named "Family Physician of the Year" at the annual meeting of the Ohio Academy of Family Physicians last summer. The academy, which promotes post-graduate education and encourages medical students to enter family medicine, gives the award each year in recognition of outstanding contributions in patient care and community service. Dr.



Art works by sculptor Harold Roach (MS '33) at the city hall, El Segundo, California.

Monroe, who has practiced family medicine in the Cuyahoga Falls, Ohio, area since 1954, has been active in many health-related civic activities, including polio immunization drives, Model Cities Health Services planning, Planned Parenthood Association of Summit County, and the Family Medicine Department of the Northeastern Ohio Universities College of Medicine.

1954

EARL EVLETH writes "Both my wife, Donna (whom I met at a Fleming House dance), and I have acquired French nationalities. We have been in Paris since 1974. I am working in theoretical chemistry at the Centre National de Recherche; and Donna is freelancing in the various libraries and archives for North American academics. We have permanently emigrated to France and are enjoying every moment of it."

1963

BOB SCHMULIAN, PhD '68, has moved to Tucson, Arizona, with his wife Rosemarie. He is managing the Materials and Component Evaluation Laboratories in the IBM Tucson Development Laboratory.

1965

CHARLES ARCHAMBEAU, PhD, a seismologist at the University of Colorado in Boulder, received a MacArthur Foundation Fellowship for his work in establishing a cooperative program with the Soviet Union to verify nuclear bans using seismic verification. He writes "I've written a series of papers on the theoretical description of earthquakes as a source of energy, and it's a mathematical treatment of an earthquake source that predicts what the radiation field will be, based on fundamental physics. It was this work, along with some theoretical modeling of explosions I did with other people over the years, that was the basis for designing discriminants that can be used to identify nuclear events."

DONALD W. GREEN was married on May 7, 1988, to Cynthia J. Bear. In June, Green became a senior vice president of The Mercator Corporation in New York City, following 11 years at the Chase Manhattan Bank.

1967

TOM BUCKHOLTZ was an Alameda County, California, cochairman for George Bush's cam-

paign. After serving on national committees on energy, and on innovation and entrepreneurship, Buckholtz attended the Republican National Convention as an alternate delegate. Locally, he coordinated the county speakers' bureau.

BENJAMIN N. EARLY, MS, PhD '70, has been appointed manager of the Analytical Models Section of the Signal Processing Department at the Aerospace Corporation.

1968

ERNO S. DANIEL was in the first group of U.S. physicians to complete the certification examination for a diploma in geriatric medicine given by the American Board of Internal Medicine. This 1988 examination was the first time in the history of American medicine that geriatrics was recognized as an area of special medical expertise. Dr. Daniel has been a member of the department of internal medicine at the Santa Barbara, California, Medical Foundation Clinic since 1978. He is chairman of the clinic's medical computer group and has a special interest in the use of duplex ultrasound in the diagnosis of vascular diseases. In recognition of his professional achievements and his community activities on behalf of seniors, he has been included in *Who's Who in California* for the past three years.

1970

KENNETH L. HULTMAN has joined the GE Research and Development Center in Schenectady, New York, as a physicist. Dr. Hultman is a member of the Institute of Electrical and Electronics Engineers and the American Physical Society. He resides in Loudonville with his wife Linda and their two daughters.

PETROS Z. MANTARAKIS has accepted the position of vice president and general manager at Dunlap & Abbott in Chatsworth, California. The company manufactures precision-machined parts for the aerospace and aircraft industries.

1981

THOMAS E. COWAN was awarded the 1988 American Physical Society biennial Dissertation Award of the Division of Nuclear Physics. Cowan, who received his PhD from Yale, is now with the Lawrence Livermore National Lab in California.

1983

PETER BALCEWICZ, MS, married Penny Anbas in October. They are living in Playa Del Rey, California. Balcewicz continues to work in the systems engineering, space, and communications group of Hughes Aircraft Company.

1985

STEPHEN J. VALERI, MS, of Warren, Michigan, has been selected by his employer, General Motors Research Laboratories, for a fellowship. He will study at the University of Michigan for a PhD in electrical engineering. Valeri has been a research engineer in the Electrical and Electronics Engineering Department since 1985.

1986

MARY E. BREWSTER, PhD, an assistant professor in the department of mathematical sciences at Rensselaer Polytechnic Institute, became the first recipient of the Richard C. DiPrima Prize at SIAM's annual meeting in Minneapolis. The prize was established in 1986 to commemorate Richard DiPrima, president of SIAM in 1979 and 1980, and longtime chair of the mathematics department at RPI. The award is to be given to a young scientist in recognition of the doctoral dissertation in applied mathematics, completed one to three years prior to the award date, and judged to be the most outstanding by the prize committee. Brewster's dissertation was entitled, "Asymptotic Analysis of Thin Plates under Normal Load and Horizontal Edge Thrust."

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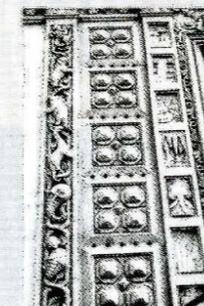
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New admissions director is intent on boosting the applicant pool from 1,600 to 2,500— and the percentage of women from 17 to 25 percent— over the next five years.

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*Historian Robert Rosenstone probes the impact of Japan on the American psyche in a new book, *Mirror in the Shrine*.*

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