CALTECH NEWS

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PUBLISHED FOR ALUMNI AND FRIENDS OF THE CALIFORNIA INSTITUTE OF TECHNOLOGY

Conversing at the annual Associates dinner at the Huntington-Sheraton are (from left) Mrs. Roland W. Lindhurst, Herman Wouk, Victor Wouk, MS'40, PhD'42, and Mrs. Truman Clawson.

Pulitzer Prizewinner Wouk calls for support of science

Herman Wouk, Pulitzer Prizewinner *(The Caine Mutiny)* and author of the recent, widely acclaimed novel, *The Winds of War,* spoke to the Caltech Associates at their annual black tie dinner in the Viennese Room of the Huntington-Sheraton Hotel on March 6.

Wouk told the audience of 340 members and friends of the Associates it was his deep belief that "the scientific community is at the leading edge of hope for the world. Because so much remains to be done. This thin film of water and air on a dead ball, the biosphere wherein we live, is threatened; and the answers to the threats must come mainly from the scientists.

"I think that's why I am an Associate," Wouk added. "I was recruited by my brother." (Victor Wouk, MS'40, PhD'42) "My arm survived the twisting because I am keenly aware that, in the first instance, the future lies with those things that these men who mark paper and blackboard can teach us in the way of mastering and saving our precious little earth."

Wouk also spoke about the philosophy behind the "immense panoramic romance" that he has been working on for almost ten years, of which *The Winds of War* is only the first part.

He described World War II as a cataclysmic human experience not yet fathomed by man, but in the shadow of which he still lives, and the ultimate outcome of which he cannot yet foresee. Wouk regards that war as an intersection of old and new—the old ways of doing things powerless against the new technology.

As preparation for an important part of his next book, which will include the development of the atomic bomb, Wouk also talked with faculty members at Caltech who had participated in the Manhattan Project.

Introduced at the dinner was the new president of the Associates, H. Warner Griggs. A senior vice president for public affairs for Union Bank in Los Angeles, Griggs succeeds W. Morton Jacobs, BS'28.

Other new officers presented at the dinner were vice president Joseph B. Earl, Jr., BS'44, president of the O. K. Earl Corporation in Pasadena; vice president Howard G. Smits, BS'31, a rancher and president of the Pacific Iron and Steel Company in San Marino; secretary John Robert White, retired partner of Price Waterhouse & Company; and treasurer John R. Mage, retired general agent for the Northwestern Mutual Life Insurance Company and president of the Santa Anita Foundation.

Haagen-Smit receives anti-pollution award

A. J. Haagen-Smit, professor of bio-organic chemistry, emeritus, met with American and British experts on pollution problems early in March at Ditchley Park near Oxford, England, as a guest of the Ditchley Foundation.

After a brief visit with relatives in his native Holland, Haagen-Smit traveled to Washington, D.C., to confer with officials of the Environmental Protection Agency. On his way back to Caltech he stopped in Dallas to receive an anti-pollution award from the American Chemical Society.

Evelyn Sharp endows scholarship in biology

Behavioral biology at Caltech has its first graduate scholarship. Mrs. Evelyn Sharp, a Life Member of the Associates and a nationally known businesswoman and real-estate developer, has given $100,000 to endow a scholarship for graduate students whose research promises better understanding of the biological reasons for human behavior.

President Brown described Mrs. Sharp's endowment as particularly important since it meets one of the Institute's current critical needs—tuition support for graduate students. Since 1967-68, when government fellowship aid was at its zenith, Caltech has seen its number of graduate fellowships from federal agencies diminished by almost 200.

"If we are to offset this reduction and continue to offer aid to qualified graduate students, we must have more private gifts like the Evelyn Sharp Scholarship," President Brown said.

Finkelsteins make gift of $2.9 million to Caltech

Mr. and Mrs. Lester M. Finkelstein of Los Angeles have made a gift to Caltech of securities and real estate valued at $2,900,000.

In making the gift, Finkelstein, an industrialist, civic leader, and philanthropist, said: "We have always had an interest in higher education, and in our opinion Caltech is the finest institution of scientific education and research in the world. Its top-caliber students, faculty, alumni, and trustees are evidence of its preeminence."

Part of the contribution is an outright gift, and part is in return for a lifetime annuity. The Finkelstein gift is not restricted to a specific purpose and can be used at the Institute's discretion.

In recognition of the gift, President Harold Brown said that a number of future Caltech teaching assistants—graduate students who assist faculty members with classroom and laboratory instruction—will be designated as Finkelstein Teaching Assistants.

"Today, private education faces financial challenges greater than in any other era," Brown said. "Individuals like the Finkelsteins, who understand the value of private education and give it their personal support, are making a contribution more important than ever before."

In commenting on the gift, William H. Corcoran, vice president for institute relations, said, "The Finkelstein gift is particularly helpful because it is not restricted to a specific purpose and can be used however it is most needed. Such contributions enable us to plan ahead on a long-range and stable basis."

Finkelstein's father came to this country in 1885 and settled in Los Angeles. He entered the steel business and was one of the early pioneers in the development of the steel industry in California. When Lester Finkelstein entered the business he expanded it until it became a leading, independent southern California steel-manufacturing plant.

Active in civic affairs, Finkelstein is past president of Mt. Sinai Hospital and of the Brandeis Institute in Los Angeles. He and Mrs. Finkelstein were founders of the Los Angeles Art Museum and associate founders of the Music Center.

Mrs. Finkelstein was born in Joplin, Missouri, and is a graduate of Washington University, St. Louis. She has followed life-long interests in music, art, and education.

Finkelstein has been a member of a five-man board on mental health for the County of Los Angeles Mental Health Commission, a member of the Board of Directors of Hope for Hearing at UCLA, and a sponsor of the Concern Foundation for cancer research.

Alumni survey to aid Institute in future plans

"Oh, no. Not another questionnaire!" This may be the initial reaction of many alumni who receive a questionnaire from Caltech this month. But as those who participated in the alumni surveys of 1952 and 1963 will remember, this is much more than another survey. It is an opportunity Caltech gives all its alumni about every 10 years to make their views known on a wide range of topics relating to the Institute.

Information compiled in this survey will help in evaluating current educational policies and in planning future directions. It will also help the Alumni Association to judge its effectiveness in serving alumni and to find out what changes alumni would like made in Association activities.

In particular, the survey will show what kinds of fields alumni are now entering and how they feel the education they received at Caltech has helped them in their careers. This year's survey will be compared with the surveys of 1952 and 1963 to show trends in the degrees earned by Caltech graduates, and their attitudes toward aspects of campus life.

Alumni will also be given a chance to evaluate the publications they receive from Caltech including *Caltech News* and *Engineering and Science* magazine. They will be asked what things they like to read about and what they would like to see added to the coverage of these publications.

The Alumni Association is hoping that all alumni will take advantage of this opportunity to make their views known and provide Caltech with the information it needs for planning. Based on the response to previous surveys, the Association is counting on at least a 70 percent response.

Acceptances mailed for Class of '77

Early this month a few bright high school seniors, with particular interests in science and math, will receive letters from the admissions office informing them that they have been accepted by Caltech as members of the Class of 1977.

Behind these letters has gone probably more work per student than is expended by any college or university in the country, for Caltech is one of the few institutions that sends faculty members to visit promising applicants in their high schools throughout the U.S.

Before the final decisions were made on applicants this month, 16 faculty members each visited 25 to 30 schools to interview students who appeared to have the qualifications for Caltech freshmen.

In New York the interviews were conducted by a committee of alumni including Robert D. Belyea, BS'47; Richard T. Brice, PhD'37; John A. Brockman, BS'42, PhD'48; Evan A. Johnson, BS'38; E. Russell Kennedy, BS'33; MS'34, PhD'36; Harry J. Moore, Jr., BS'48; Frank E. Scheck, BS'48; Dudley B. Smith, BS'45; and Victor Wouk, MS'40, PhD'42.

Peter Miller, director of admissions, stresses the importance of personal interviews in making the final selection of new students. "Of course we look at an applicant's grades and College Board scores, particularly in the areas of math and science," he says, "but there are a lot of things you can't find out from scores and grades—like how interested a student really is in doing research. This you can determine much better by talking to the student and his or her science teachers."

Miller says the personal interviews are also important in giving the high school students a chance to discuss questions they might have about Caltech. "This helps a lot of students decide if they and Caltech are suited for each other," he says.

In addition, Miller believes the calls by faculty members also encourage future students to apply to Caltech. "Both the teachers and the students seem to appreciate the fact that someone from Caltech has taken the trouble to visit their school."

For the first time this year, a committee of alumni in Chicago made an effort to call on high schools in their area before the time of applications to talk to counselors and teachers about Caltech.

Members of the Chicago committee are chairman Philip E. Smith, BS'39; Eben Vey, BS'41, MS'42, CE'43; Robert J. Kieckhefer, BS'45; Howard E. Jessen, BS'46; and Leonard H. Gordy, BS'66.

If the results of the committee's work in Chicago prove successful, Miller says a similar effort may be made by alumni in other parts of the country. This program would be coordinated by the Alumni Association's high school relations committee which includes chairman Spicer Conant, BS'64; Stuart M. Butler, Jr., BS'48, and James L. Higgins, BS'56.

Miller says he expects the freshman class will have about 220 students, including 30 women and 190 men. There were 900 applicants this year, a slight increase over last year.

Faculty Profile

Wood combines teaching, research

by Winifred Kennedy

Professor William B. Wood is a microbiologist, and a good one. Last year, at 34, he became one of the youngest scientists to be elected to the National Academy of Sciences. But Bill Wood is more than a bright scientist; he is also an outstanding teacher.

While he was conducting the research that earned him election to the NAS, he also found the time to launch several teaching innovations and became one of Caltech's most popular teachers.

The son of the former chairman of the microbiology department at the Johns Hopkins Medical School, Wood says he had planned to become a scientist for as long as he can remember. But he also says that if he had chosen another field for his career it would have been education.

"Even if I were teaching education I'd still probably be a scientist because I couldn't resist becoming involved in research into the way people learn and what creates an effective learning situation," he said.

Discussing his educational philosophy, Wood continued, "Changes are due in the curricula of colleges and universities today—changes that will help students become more independent and self-directed in their learning. The most important lesson that a young person can master today is how to learn.

"Knowledge is expanding so fast that we can't possibly equip a student with all he'll need to know—even within the next decade. If we rigidly prescribe what he's supposed to learn—and send him away thinking that the only way to learn is to take a course—then he'll be in trouble. But if we can help him become an effective, independent learner, then he'll get along, in spite of the knowledge explosion."

To help his students become effective, independent learners has become a major objective for Wood, in his undergraduate teaching as well as in the supervision of his graduate research group. As one means of achieving this goal, he organized an introductory biochemistry course that gives students great latitude in designing course content to meet their varying needs.

While mastering a core of basic material, they can select from a variety of projects to earn the remainder of their credits. They write reviews of current biochemical literature, present seminars, think up research projects, build molecular models, design computer programs to simulate biological systems, or read independently.

Leroy E. Hood, asistant professor of biology, who teaches the course with Wood, commented, "In this class many students have their first exposure to an exhilarating and horrifying world in which they're responsible for the character and pace of their own learning experience—and this can be hazardous, for they may let their other course work expand and fill their biochemistry time. But the good students find the course to be a wonderful period of growth and freedom."

As a further means to enable students to match learning experience with individual need, Wood has helped launch a tutorial program for undergraduate biologists. This has proved so successful that now it is open to students outside the division.

The tutorial approach grew out of Wood's realization that an abundance of talent in the division was not being tapped—that faculty, postdocs, and graduate students possessed a wealth of information they'd like to share. The result is a series of informal classes with a minimum of formal structure—generally consisting of two or three students and an instructor—in which everyone works together in an area of mutual interest.

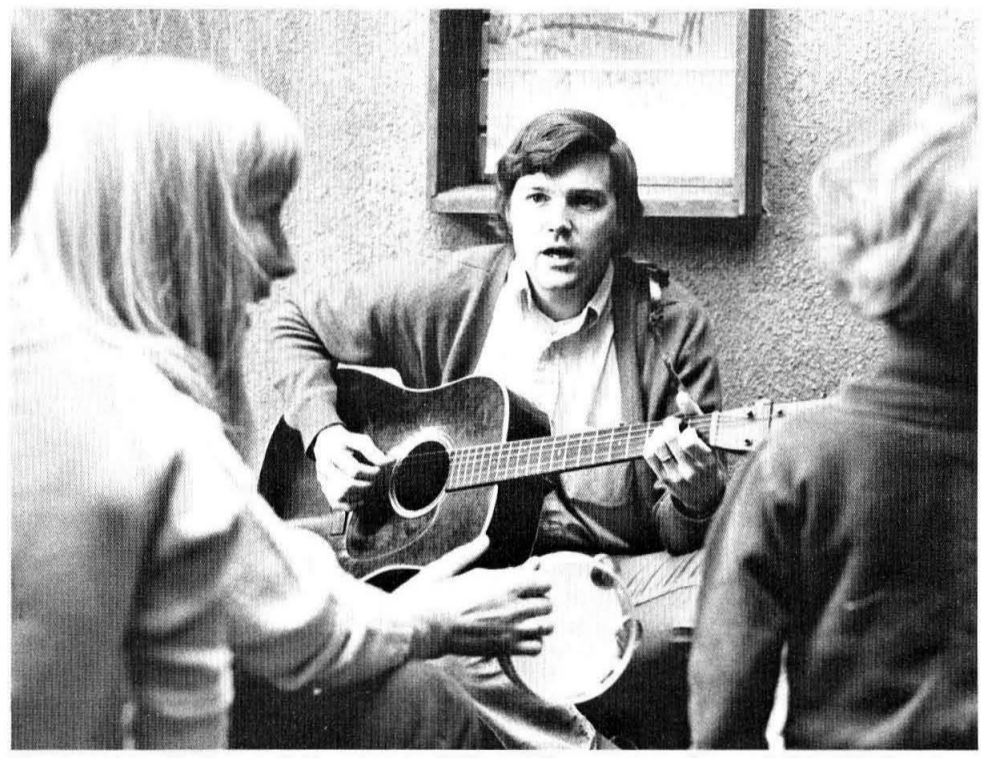
Wood and his wife, Renate, will participate in the program this spring by conducting a tutorial on teaching—and how learning can be made easier in various situations.

Still another of Wood's educationally oriented projects is a book that he is writing with Lee Hood about new approaches to teaching biochemistry. The authors expect to complete the text this summer.

Underlying Wood's deep interest in education may be his correspondingly deep concern for people. Gregory Del Zoppo, a graduate student in Wood's research group, said, "What attracted me to Bill was that he seemed interested in me as an individual. People are important to him as personalities. Students fly in and out of his office all the time with questions or bits of information they want to share, and he's always very receptive."

In a poll to select popular teachers at Caltech, undoubtedly Wood would rank high. A colleague summarized his teaching abilities by saying, "He's first-rate at teaching, as he is at everything. He's clear and well organized in his presentation, with a thorough knowledge of the history of his subject as well as its formal content. He's extremely conscientious."

Del Zoppo said, "He takes his teaching very seriously. Hardly anything gets him down more than feeling that the kids aren't understanding his material. He really cares about that."



Wood and his wife, Renate (left), entertain children at the parent-run Sequoyah School in Pasadena.

In his role as mentor to his research group, Wood remains true to his belief that one of the most important responsibilities of a teacher is to show his students how to learn. "The most valuable contribution I can make to their professional growth," he said, "is to give them the confidence that they can do science."

In keeping with this conviction, Wood runs his group with a minimum of outside pressure. Del Zoppo said, "I learned pretty quickly that I was expected to supply my own inner pressure. I learned to make my own decisions—even if I didn't want to. I soon developed my own inner motivation, and it's been very satisfying to work on that basis.

"But even though the group seems to be functioning in a relaxed sort of way you know that you had better cover every path and that your results had better be as correct as they can possibly be. Bill may be informal in the way he runs the group but he's extremely thorough. That's a good combination."

The rapport, which begins in the laboratory among members of Wood's informal but meticulously thorough research group, carries over into nonacademic pursuits. Members gather informally in a lounge across the hall to discuss their research over coffee or while playing darts—Wood gave them the board as a Christmas present. They convene periodically for beach parties, picnics, or dinners at the Woods' home.

At these gatherings the group often asks Wood to play the guitar—a hobby he has enjoyed since his undergrad days at Harvard. Back then he made a recording with a talented but unknown young folk singer. Her name was Joan Baez.

When Wood is active in his primary role as scientist, he brings to his work a scrupulous concern for detail and a tremendous enthusiasm for the ideas he is pursuing.

Most recently these enthusiasms have centered around his work with the bacteriophage T4, and the way in which this virus is assembled. Wood has been using genetic and biochemical techniques as well as electron microscopy for this study. His experiments have led to the surprising discovery that the various parts of the virus are made separately and then assembled on a submicroscopic assembly line.

Earlier, he was involved in studies of the mechanism that enables bacteria to recognize and destroy foreign DNA when it enters a cell.

Wood completed his undergraduate work at Harvard College in 1959 and received his PhD from Stanford University in 1963. Just before joining the Caltech faculty, he spent two years working on microbial genetics as a postdoctoral research fellow in the department of biophysics at the University of Geneva. The two years there were a kind of homecoming for Mrs. Wood, a native of Germany. The couple met while Wood was on a summer trip to Europe. The Woods now have two sons, ages 7 and 4.

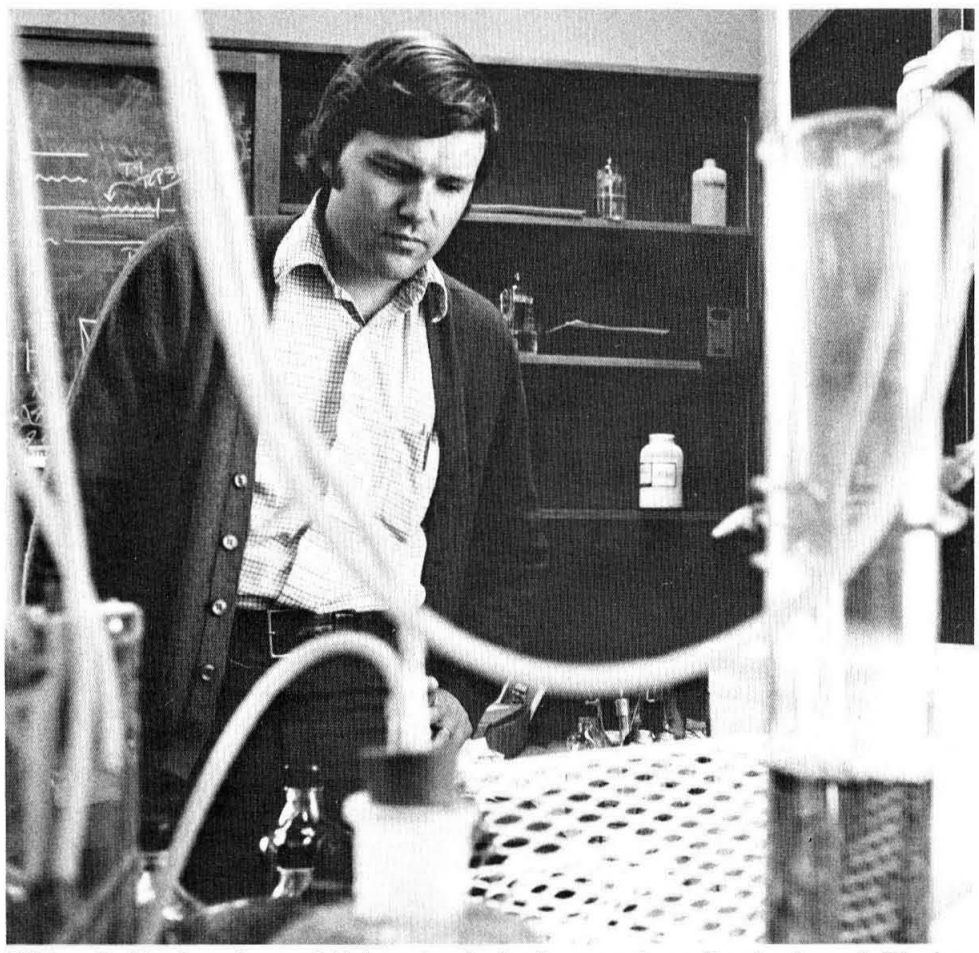
They are both interested in primary education, and are deeply involved with the Sequoyah School in Pasadena, a parent-run independent school, which their children attend. Wood is currently the school's vice president, and Mrs. Wood teaches a preschool group three days a week.

A favorite pastime of the Wood family is camping in the desert—a pleasure to which they were introduced by Max Delbrück. Wood is also a tennis buff, and consistently wins the biology division tennis championship.

As he looks to the future in biology, Wood sees many reasons for future enthusiasm. "Biology is at a tremendously exciting point in its development, and knowledge in the field is expanding rapidly," he said. "During the 50's and 60's, the big challenge for biologists was to understand what happens at the level of the individual cell. We've gone a long way toward achieving this understanding. Now the challenge is to apply our knowledge to more complicated systems—such as man—and to learn more about how a multicellular organism works.

"Biology used to be primarily a descriptive science, lacking in interest for people who wanted to do analytical work. But it is now emerging as a coherent discipline with unifying principles of its own, and it has become more challenging for people who formerly would have become physicists or chemists.

"This is one reason for the tremendous growth in the number of biology majors. Another reason, of course, is a general desire on the part of students to do something relevant in connection with society's needs. Biology is the route into medicine or environmental engineering or population studies—into a lot of fields connected with problems in our society that have a biological basis."



William B. Wood, professor of biology, is a leader in research on the structure of T4 virus.

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Jack Schmitt to speak on Seminar Day

A record number of Caltech alumni and their guests are expected on campus for the 36th annual Alumni Seminar Day on Saturday, May 12.

Harrison H. (Jack) Schmitt, BS'57, will be the featured speaker at the 2 p.m. general session in Beckman Auditorium, which should be filled to capacity. Schmitt, the first scientist to explore the moon, will describe his experiences on Apollo 17, America's most successful and, perhaps, final lunar expedition.

Alumni and their guests will have the opportunity to hear about Caltech's latest developments in research and education from 12 outstanding lecturers.

Seminar Day, for the first time in its history, will feature a divisional exhibit, "The Earth and Space," to be presented by the division of geological and planetary sciences from 11:30 a.m. to 1:30 p.m.

The exhibit will show the division's role in U.S. lunar and planetary exploration, including Schmitt's historic Apollo 17 flight.

Visitors to Arms and Mudd Laboratories will have a chance to:

- View a computer demonstration in the rare-gas laboratory.
- Take a look into the Lunatic Asylum—the lunar clean laboratory.
- View a Mars-Mariner photographic exhibit.
- Check out the Apollo 17 crew geology training in the Psycho Room.
- Visit the mass-spectrometer laboratory.
- See the lunar neutron probe used on the Apollo 17 mission.

Students participating in the Clean-Air Car Project of the Environmental Quality Laboratory will have a car on display from 12:30 to 2 p.m. in their special garage behind Lauritsen and Downs.

Baxter Art Gallery will also put on an exhibit from 10 a.m. to 5 p.m. featuring the works of the Tijuana Five—a group of artists from Mexico, whose multimedia collection includes sculpture, tapestries, and paintings.

Registration for Seminar Day will begin at 8:30 a.m. and lectures are scheduled from 9:30 a.m. to 5:30 p.m.

Harrison H. (Jack) Schmitt, BS'57 (left), shown on pre-lunar field trip with fellow astronaut Eugene A. Cernan, will describe his experiences on Apollo 17 mission for alumni on Seminar Day.

Alfresco luncheon will be served by the Athenaeum at 12:30 to 1 p.m. and again at 1:15 to 1:45 p.m. Luncheon times will be assigned in advance. The Caltech Band will entertain alumni and their guests during this period.

There will be a no-host cocktail party at the Athenaeum beginning at 5:30 p.m., followed by dinner at 6:30.

The Caltech Glee Club's annual Home Concert at 8 p.m. in Beckman Auditorium will conclude the day's varied program of activities.

Here is a listing of the featured lecturers and their seminar topics:

Sexism Medieval and Modern: The Strange Case of the Correspondence of Abelard and Heloise
John F. Benton
Professor of History

The medieval lovers Abelard and Heloise have left their mark on history through a moving exchange of letters. Now, after research in the manuscripts of the convent Abelard founded for Heloise, the speaker argues that the correspondence is a forgery, probably composed by a monk trying to challenge an abbess who ruled both women and men. Modern historians—mostly male—have looked for romance rather than fraud in the image of a woman who put love before marriage.

The Meaning of Dreams
Louis Breger
Associate Professor of Psychology

The discovery of techniques for monitoring sleep now enables us to detect the onset and duration of rapid eye movement (REM) periods during which dreaming occurs. Subjects awakened from these periods can report an extensive sample of dreams. Using dream data obtained in this way it is possible to understand the meaning of symbols and the function of dreaming. Examples of tape-recorded dreams will be presented.

The New Math: Where Is It Heading?
Robert P. Dilworth
Professor of Mathematics

During the past two decades there has been a revolution in primary and secondary mathematics instruction. In recent years, these innovations have been accompanied by lively experimentation in organizing the whole educational process, including performance contracting, behavioral objectives, free schools and computer-assisted instruction. Some of the implications of these developments for the future of mathematics education will be explored.

Integrated Optical Circuits for Communications
Elsa M. Garmire
Senior Research Fellow
in Applied Science

The development of miniature solid state optical circuits parallels the earlier development of integrated electronic circuits. The recent availability of very low loss optical fibers opens the way to lightweight optical communication systems of vastly higher capacity than their electronic counterparts. However, the appropriate optical transmitters, repeaters and receivers do not yet exist. Fundamental work toward the development of these devices now under way at Caltech will be described.

Cosmology and the Beginning of Time
James E. Gunn
Professor of Astronomy

Discoveries in the past four years have vastly increased our knowledge of the structure and origins of the universe. It is now almost certain that the geometry of space must have one of three simple forms; and that the universe began in a hot, highly compressed, and very uniform state. Observations in the next few years should shed much light on missing details, and may help decide whether the universe will have as violent an end as its beginning.

The Shape of the Sun and Relativity
Andrew P. Ingersoll
Associate Professor of
Planetary Science

In 1966 the distinguished Princeton physicist, R. H. Dicke, presented observations indicating that the sun's equatorial bulge is six times greater than what had been expected. This upset the evidence supporting Einstein's general theory of relativity and led to a lively and still unresolved scientific debate. The speaker will describe his own role in this controversy, on the side of Einstein, and will illustrate some of his own reasons for doing science.

Sharpening Biomedical Images
Robert Nathan
Member of Technical Staff, JPL

Digital-computer methods developed at JPL to bring out detail and extract information from spacecraft camera photographs are being used on clinical x-ray radiographs and light and electron microscope images. The applications include research on arteriosclerosis, automating chromosome analysis (karyotyping), and using electron microscopy to view atoms.

Man's Impact on Nearshore Waters of Southern California
Wheeler J. North
Professor of Environmental Science

Human activities affect nearshore waters of the oceans in many ways. Such waters are intensely utilized in southern California, and the region is an excellent site for examining man's impact. The six major problem areas we have observed, in order of ascending importance are: thermal effluents, accidents, sewage disposal, consumptive uses, isolation, and habitat deterioration. The nature of these problems and potential solutions will be discussed.

Pleasure Centers in the Brain
James Olds
Bing Professor of Behavioral Biology

The Molecular Structure of Seeing
G. Wilse Robinson
Professor of Physical Chemistry

The various senses—touch, vision, smell, taste, and hearing—are designed to transmit to the brain information derived from a sometimes vanishingly small quantity of an external stimulus. The chemoreceptors of taste and smell are able to detect and to identify molecules at a concentration much lower than that sensed by any analytical instrument, and the photoreceptor cells of the eye are rivaled only by the most sensitive photomultipliers and photon-counting devices of the modern laboratory. How do these senses work? This poses a challenging problem to the chemist since the answer to this question is only meaningful at the molecular level.

How the Worm Turns
Richard L. Russell
Assistant Professor of Biology

Behaviorial studies, genetics, electron microscopy, and computer-aided, three-dimensional reconstruction are being used to analyze in detail the "wiring diagram" of a very simple nervous system—that of a small soil nematode, or roundworm. The goal is to understand the nervous circuitry well enough to predict the animal's behavior; to tell, in short, "how the worm turns."

Color films demonstrate this animal's normal and mutant behaviors and show how the three-dimensional reconstruction is done.

Harnessing the Sun
Jerome M. Weingart
Senior Research Fellow
in Environmental Engineering

Although attractive as a virtually limitless energy source, sunlight until recently has been considered impractical for large-scale use. Increased environmental concerns, rapidly rising prices for traditional forms of energy, and advances in technology have led to a recent reexamination of the many possible applications of solar energy.

These exciting possibilities will be explained in a multimedia presentation with multiple projections, music, and solar-conversion demonstrations.

Coming Events

Friday, Apr. 6, 8 p.m. Ramo
YOUNG CONCERT ARTISTS SERIES: Joy Blackett, mezzo-soprano. $3; Students, $2.

Saturday, Apr. 7, 8 p.m. Beckman
Greek folk singer NANA MOUSKOURI and the Athenians in a program of international music and song. $6.75.

Sunday, Apr. 8, 3:30 p.m. Beckman
COLEMAN CHAMBER MUSIC CONCERT: Ralph Kirkpatrick, harpsichordist. $5-4-3-2.50; Students, $1 discount.

Monday, Apr. 9, 8 p.m. Beckman
EARNEST C. WATSON CALTECH LECTURE SERIES: "Where Were the Pharaohs Buried?—Probing the Pyramids with Cosmic Rays," Luis D. Alvarez, professor of physics, UC Berkeley.

Wednesday, Apr. 11, 8 p.m. Beckman
Pianist HORACIO GUITIERREZ, acclaimed Cuban-born virtuoso. $5.50-4.50-3.50-2.50.

Saturday, Apr. 14, 8 p.m. Beckman
GUITAR SERIES: Los Angeles Chamber Orchestra, conducted by Neville Marriner, and Pepe Romero, guitar, in a program of Vivaldi, Stravinsky, and Tchaikovsky. $6.75-5.75-4.50-3.50.

Monday, Apr. 23, 8 p.m. Beckman
EARNEST C. WATSON CALTECH LECTURE SERIES: "Holograms and Lasers," Nicholas George, associate professor of electrical engineering, Caltech.

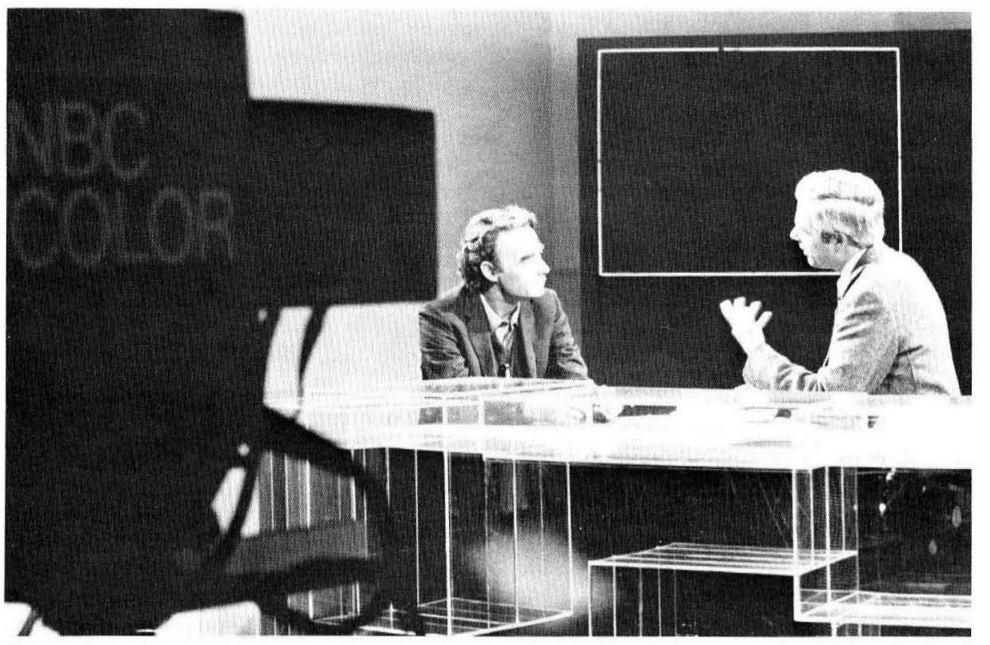
Tuesday, Apr. 24, 8 p.m. Beckman
GUITAR SERIES: Christopher Parkening, classical guitarist. $5.50-4.50-3.50-2.50.

Saturday, Apr. 28, 11 a.m. and 2 p.m. Beckman
CHILDREN'S SERIES: "The Nearsighted Knight and the Farsighted Dragon," world premiere of a new musical play for children. Children, $1.50; Adults, $2.

Sunday, Apr. 29, 3:30 p.m. Ramo
COLEMAN AUDITION WINNERS in concert. $2.

Fri. & Sat., May 4 & 5, 8 p.m. Beckman
ERIC HAWKINS DANCE COMPANY. $6-5-4-3.

Caltech on KNBC



James Quirk (left), Caltech professor of economics, is questioned about his research on the business of baseball during interview with newscaster Robert Abernethy on KNBC program.

Caltech radio club has long history

by Janet Lansburgh

Caltech's radio club may be the oldest in southern California, according to Bob Palitz, a sophomore engineering student who is this year's secretary-treasurer of the club.

Going through some old *Big T* yearbooks, Palitz discovered that a radio club was organized and went on the air in 1919, as soon as the U.S. Navy lifted its ban on amateur transmission.

The first group picture of the radio club appeared in the *Big T* of 1924. The club was active throughout the 1920's, and in 1926 its members did something that was not too common at the time. The signal from their 100-watt transmitter was received by a station in Great Britain. (The usual power of transmitters capable of sending a signal that far in those days was almost 1,000 watts.)

Down through the years, many radio-club members went on to successful careers. In 1933 William Pickering, BS'32, MS'33, PhD'36, who later became director of JPL, was president of the club while he was working for his master's degree. Another radio-club president (in 1947) was Roy Gould, BS'49, PhD'56, now a professor of electrical engineering and physics at Caltech.

As far as Palitz can figure out, the radio club was first located in an obscure place on campus called "The Ark," but he is not sure where. "It was sort of a shack used as the student center," he says. "If any alumni remember it, I would sure like to hear from them."

Sometimes, the club occupied 401 Bridge, next to the elevator shaft; also the fan room in Fleming. The club seemed to bounce back and forth between these two locations over the years, according to Palitz.

Since 1962 the radio club has been in its present location in room 207 at the Winnett Student Center. The only problem seems to be that the club's antennas are on the roof of Spalding Lab. "We lose 80 percent of our power between our station and the antennas," Palitz says.

In addition to Palitz, the radio-club officers include Brett Tucker (a senior) who is president, and Dave Drake (a junior) who is technical director. They are better known in the world of ham radio by their call letters: WA2DNB (Tucker), WB2FEH (Palitz), and WA2YQD (Drake).

The club's 25 members are all interested in public-service activities but, as in past years, they are hampered by a lack of equipment. They have received $750 from ASCIT so far this year, but they figure they will need twice that amount in order to give the kind of public service they envision.

During the Nicaraguan earthquake this year the club handled about 50 messages from various parts of that country. Last year Caltech was rated number one on what is called the "Public Service Honor Roll," put out by the American Radio Relay League—a club with over 100,000 members. One problem is that to send in all information required for such ratings takes more time than the average Caltech student can spare.

Club members Paul Manis, Brett Tucker, Paul Drake, and Bob Palitz carry on a long tradition.

Each January the club participates in emergency drills set up by the American Radio Relay League, in which disasters are simulated. Last January a simulated flood was staged in southern California, and the Caltech bunch was responsible for communicating all emergency information on water supplies.

Palitz says the radio club makes a lot of "phone patches" for Caltech people and would like to do more. A phone patch is a direct interconnection between an amateur's radio and the telephone.

For instance, Palitz gets in touch with a friend in his New Jersey neighborhood about every two weeks. The friend calls Palitz's parents, who can talk to Bob directly through the friend's radio and the telephone.

The club members will undertake this service for anyone on campus who wants to get in touch with parents or friends in some other area. Last year during second and third terms, the club handled about 300 phone patches. The longest patch was for a man on Canton Island in the southwest Pacific who asked the Caltech hams to put him in telephone contact with his wife in Oxnard.

What does Ma Bell think of all this? Palitz insists that it's all OK. "At first," he says, "the phone company charged a tariff on patches, but about three years ago the Federal Communications Commission told them they couldn't.

"It's legal for amateurs to run phone patches and, anyway, the phone company's getting revenue they normally wouldn't get. Saying we're competing with the phone company is like saying the post office is competing with them."

Radio-club members now operate five stations on campus, all with the radio-club call sign of W6UE. Two of the stations are operating phone patches, including the one in the club room and the one in Palitz's room, which is an extension of the radio club phone.

If the Caltech hams had more money, they would like to get a formal system going so that they could have mail drops at various locations on campus. They would then handle written messages as well as phone patches.

The club would also like to work with amateur communications satellites. So far, six of these satellites have been built by amateurs and launched free of charge by NASA. Amateurs have contributed some unusual ideas for designing the satellites, including the one that's under consideration now. It is distinguished by having a nicely working antenna made from a Sears tape measure.

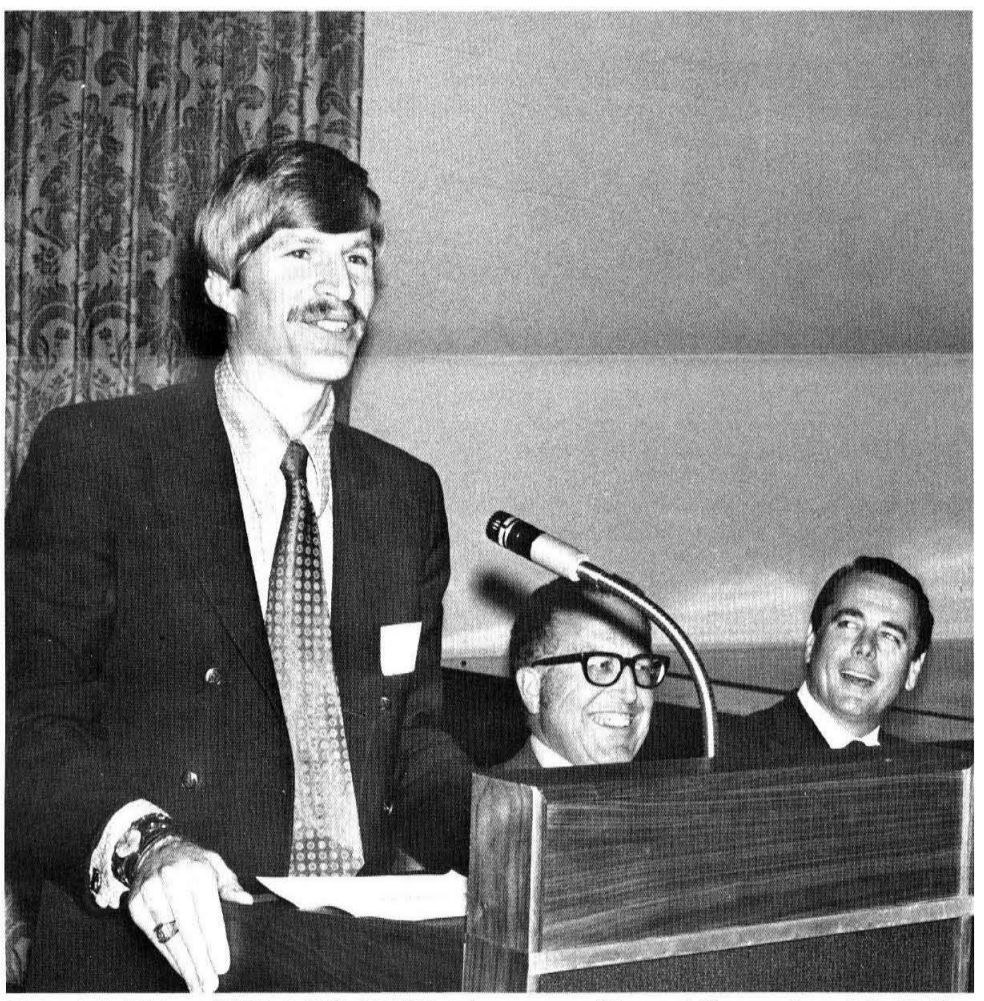
According to Palitz, an amateur can take an average signal, point it at the satellite, and send it up. The satellite then transmits the signal on a different frequency.

"Some people have had ranges of communication up to 10,000 miles on frequency bands that are generally considered to be good for maybe 100 to 200 miles," Palitz says.

The radio club would like to have more equipment not only to hook into the satellite, but also to do moon bounces. According to Palitz, some amateurs have transmitters under 1,000 watts with large enough antennas to bounce a signal off the moon.

Palitz has dreams for the future—like, for example, using one of the large dishes at the Goldstone tracking station. He and his fellow Caltech hams are going to propose this idea through the members of JPL's radio club, with whom they work very closely. In fact, Nash Williams of the JPL group is the trustee for Caltech's station license.

Of the 400,000 amateur radio operators in the world (300,000 of whom are in the U.S.), it is doubtful whether there are any more dedicated hams than those of Caltech's W6UE, a group with its roots in history and its sights on outer space.



Richard C. Nielsen, BS'66, MS'67, PhD'71, takes over presidency of Gnomes from John R. Fee, BS'51 (center), at Founder's Day dinner, at which Lt. Gov. Edwin Reinecke, BS'50, was speaker.

Reinecke addresses Gnomes at annual Founders dinner

Gnome Edwin Reinecke, BS'50, lieutenant governor of California and former U.S. Congressman, presented a case history of an engineer in politics to his Caltech fraternity brothers at the Gnomes' annual Founder's Day dinner in the Athenaeum, March 9.

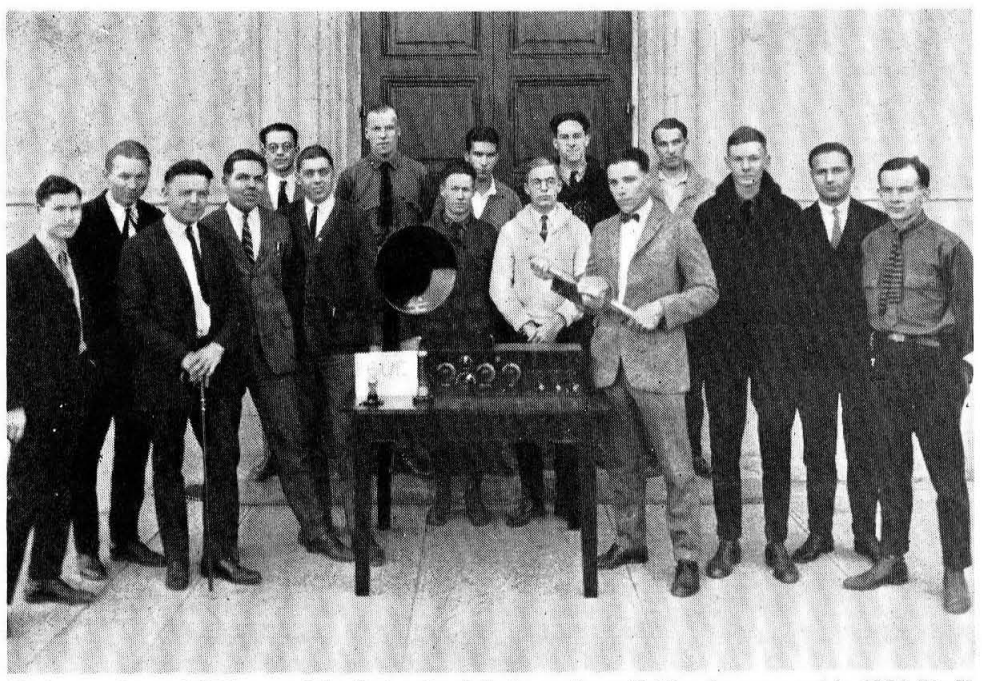
Reinecke, one of the front runners for the 1976 race for governor, described some of his experiences in the political arenas of Washington and Sacramento. He also called for a more scientific, logical approach to making decisions in government.

Urging all scientists and engineers to find out more about what their lawmakers are doing, Reinecke said, "You'll probably discover that things are even worse than you thought they were." But he added, "Lawmakers will pay attention if they think you know what's going on."

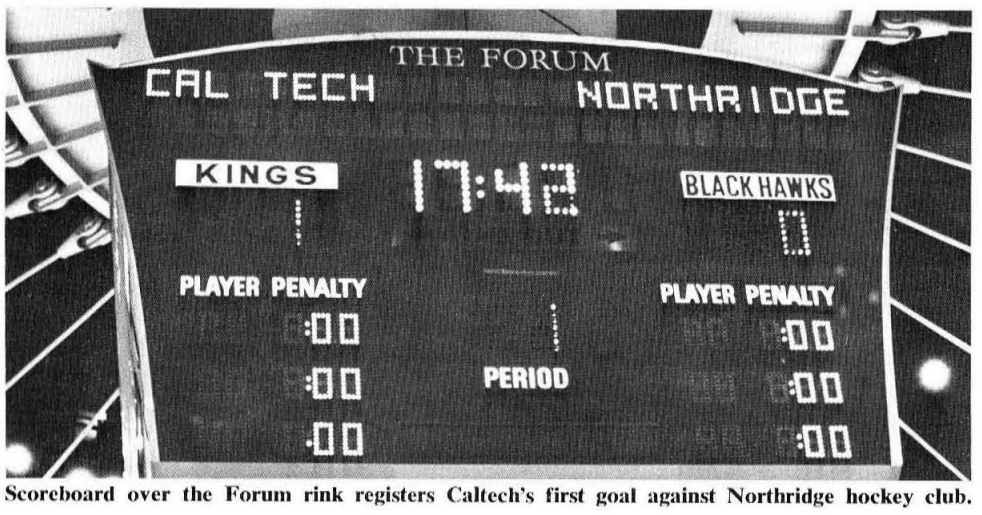
Another featured speaker at the Gnome dinner was the president of the Alumni Association, Arthur O. Spaulding, BS'49, MS'50, who gave a run-down on the Association activities during the past year.

Two former ASCIT presidents were also on hand to thank the Gnomes for their support. Steve Watkins, a senior, expressed the appreciation of all Caltech undergraduates for the Gnomes' gift of $4,000 to purchase a small bus for student transportation. Watkins' successor, Joe Morin, also a senior, thanked the Gnomes for their support of his scholarship.

John R. Fee, BS'51, outgoing Gnome president, described some of the highlights of the club's activities during the year before passing the gavel to the new president, Richard C. Nielsen, BS'66, MS '67, PhD'71. Other Gnome officers are: vice president Oliver H. Gardner, BS'51; secretary Peter S. Bloomfield, BS'68; treasurer Dave Browne, BS'49; and directors Fred A. Wheeler, BS'29, and Stephen H. Garrison, BS'65, MS'66.



Early members of 6UE, one of the first radio clubs in southern California, appeared in 1924 *Big T*.



Scoreboard over the Forum rink registers Caltech's first goal against Northridge hockey club.

Caltech's hockey club plays Northridge in Fabulous Forum

It was a little like a Walter Mitty dream. Here was the Caltech hockey team on the ice of the Fabulous Forum, home of the National Hockey League's Los Angeles Kings.

It didn't matter that it was an afternoon match with Cal State Northridge before the Kings-Black Hawks game that evening, March 8. When the Caltech name went up on the scoreboard over the center rink it was the big time for the collection of undergrads, grad students, and two faculty members who make up the hockey club.

The wonder is that the group from Caltech was even able to put together a team, much less play in the Forum. Although the Alumni Association, ASCIT, and the Graduate Student Council contribute to its support, the hockey club is not a varsity sport and is not run by the athletic department.

Players must pay dues to join and the coach, Dr. Jim Warden of Pasadena, not only gives his time, he also helps dig up the team uniforms for next to nothing.

The only rink available for practice is in West Covina and the only time the team can get on the ice there is from 11 p.m. to 1:30 a.m., not the ideal time of the night to play hockey.

Larry Ford, a grad student in math from New Hampshire, deserves a lot of credit for getting the team together, along with Professor Fred Culick, former MIT varsity skater, who is the faculty adviser and a player for Caltech.

The Caltech club is a member of the Pacific Southwest College Hockey League that includes San Diego State, Northern Arizona University, the University of New Mexico, UCLA, and Cal State Northridge.

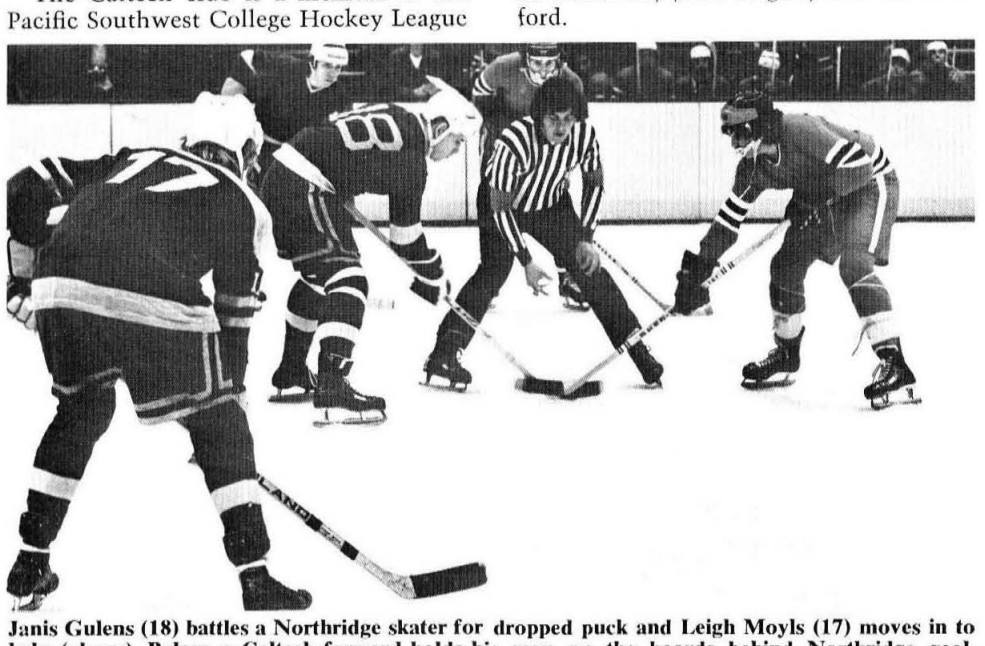
Before the game in the Forum, the Caltech stickmen had tied UCLA, 5-5, tied and lost to Northern Arizona 1-1, 5-4, and beaten Northridge, 6-3.

It looked as if Caltech was on its way to another victory over Northridge in the opening seconds of their game in the Forum when Dave Evans took a pass from Willie Lennard and slammed home a goal for a 1-0 lead. But the San Fernando Valley skaters came back with three straight goals to move ahead 3-1 before the end of the first period.

Caltech opened the second period with a score by George Yates on an assist from Leigh Moyls and Janis Gulens, but Northridge skated away from there for an 11-2 win. Caltech goalie Dan Margoliash put up a valiant battle making 30 saves and was one of three outstanding players selected to receive tickets to a Kings game.

The Caltech skaters fared better in an exhibition between periods of the Kings-Black Hawks game that night as they played Northridge to a scoreless tie before a crowd of 12,000, perhaps the largest crowd to watch a Caltech team perform.

Other members of the Caltech squad who saw action against Northridge, besides those mentioned, were Bob Gardiner, Doug Rathnie, Byron Davis, Billie Harris, Russ Timkovich, Rex Gibbons, Ed Beckman, John Rogers, and Ed Bickford.



Janis Gulens (18) battles a Northridge skater for dropped puck and Leigh Moyls (17) moves in to help (above). Below, a Caltech forward holds his man on the boards behind Northridge goal.

Robinson ties, breaks record for 100 and 220-yard sprints

Haywood Robinson, a junior who ran in his first varsity meet last year, has already earned a place for himself in the Caltech record book this season. In the same meet against Redlands, Robinson tied a school record of 9.7 seconds in the 100-yard dash and then, an hour later, set a new mark of 22.0 in the 220 sprint.

The record in the 100 was originally established 46 years ago by the late Murray Schultz, BS'27. The best time in the 220 by a Caltech sprinter before Robinson was a 22.4-second mark set in 1967 by Jim Stanley, BS'68.

"I don't think I've ever seen this much improvement by an athlete," said Coach Bert LaBrucherie. "It's certainly been a rewarding experience for a coach to see what Haywood has done."

Haywood Robinson

Robinson, who did not go out for track at Jefferson High School in Los Angeles, first attracted LaBrucherie's attention when he won the Interhouse competition in the 100 and 220-yard sprints in the times of 10.3 and 23.5.

Improving steadily last season, Robinson surprised even his teammates by finishing third in the all-conference meet in the 100-yard dash with a 9.8 mark, his best time of the year.

This year LaBrucherie says Robinson is getting off to a better start and seems to be getting stronger in every meet. So far Robinson has the best time in the conference in the 100-yard sprint, but the man he will have to beat for the all-conference title is Charles Debata of Whittier who won the event last year in 9.6.

Robinson also has the best time in the conference this season in the 220 and should be a strong contender for the title in this event. In addition to the sprints, Robinson runs the first leg for Caltech in the mile and 440-yard relays. So far the mile relay team has a perfect record in four meets while the 440 foursome is 2-2.

At the rate he is improving, Robinson may also be heard from in the NAIA national championships. And with another year to compete, Haywood should be a good bet to set marks that will keep his name in the record books as long as Murray Schultz, BS'27.

Physics major earns Churchill fellowship

Stanley E. Whitcomb, a senior majoring in physics, has received one of ten Winston Churchill Foundation grants awarded in the United States this year.

The grants enable the winners to study for from one to two years at Churchill College at Cambridge University in England. Whitcomb will receive transportation, tuition, and fees, and $1,750 toward room and board and books.

Whitcomb is considered one of Caltech's outstanding physics students. Last year, by vote of the division faculty, he was awarded the Haren Lee Fisher prize as the best junior physics student. As a sophomore he was awarded honor standing for his academic achievements.

This year Whitcomb is an undergraduate teaching assistant working in a research group headed by Rochus Vogt, professor of physics, designing a cosmic ray electron detector.

Whitcomb was born in Englewood, Colorado, and graduated from Englewood High School where he stood first in his class of 440.

Placement Assistance To Caltech Alumni

The Caltech Placement Service may be of assistance to you in one of the following ways:

(1) Help you when you become unemployed or need to change employment.

(2) Inform you of possible opportunities from time to time.

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Caltech Placement Service
California Institute of Technology
Pasadena, California 91109

Please send me: (Check one)

☐ An application for placement assistance

☐ A form indicating a desire to keep watch for opportunities although I am not contemplating a change.

Name .....

Degree(s) ..... Year(s) .....

Address .....

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PERSONALS

1925
ROBERT T. DILLON, MS'27, PhD'29, has retired from G.D. Searle and Company in Chicago and is now living in Albuquerque.

1930
R. STANLEY LORD retired after 41 years with the U.S. Geological Survey. At the time of his retirement he was serving as chief of the California district of the water resources division. He is now living in Menlo Park, California.

1932
HENRY J. WELGE, MS, PhD'36, has retired from his position as senior research chemist, but continues as a consultant to Exxon Company in Houston.

1935
BERNARD B. WATSON, PhD, formerly with Research Analysis Corporation, is now with the operations analysis division of General Research Corporation in McLean, Virginia.

1940
JAMES V. CRAWFORD, MS'41, has been appointed senior executive vice president of The Garrett Corporation. He has been with The Garrett Corporation in Los Angeles since 1941 and had previously served in various technical and managerial capacities for this large diversified manufacturing and engineering firm.

1942
WARREN A. HALL, formerly a professor of engineering at UC Riverside, is now acting director of the office of water resources research in the U.S. Department of the Interior.

1943
RAYMOND F. HARLESS, MS, is now deputy commissioner of the Internal Revenue Service. He was formerly district director for the IRS in San Francisco.

C. MEADE PATTERSON, MS, is now an oceanographer for the U.S. Naval Oceanographic Office in Suitland, Maryland.

1948
PHILIP EISENBERG, president of Hydranautics, Inc., of Laurel, Maryland, was elected president of the Society of Naval Architects and Marine Engineers at the annual meeting of the 10,000-member organization. Last year, the Society awarded him its highest honor, the David W. Taylor Medal. This news was reported by J. DAVIS SHUSTER, BS'27.

GEORGE L. HUMPHREY, MS, is professor and associate chairman of chemistry at West Virginia University in Morgantown.

HAROLD A. ROSEN, MS, PhD'51, manager of the commercial satellite system of Hughes Aircraft Company, was honored as the southern California inventor of the year by the Patent Law Association in Los Angeles. Rosen was recognized for his development of the world's first synchronized satellite system.

1951
PIERRE ST. AMAND, MS, PhD'53, head of the earth and planetary sciences division of the Naval Weapons Center at China Lake, was one of six international experts invited to Nicaragua by the Organization of American States to give advice on the reconstruction of earthquake-torn Managua.

LEO L. BAGGERLY, MS'52, PhD'56, is now a professor at the school of natural sciences and mathematics at California State College, Bakersfield.

1952
NIKHILESH ROY, MS, is now professor and head of the department of civil and municipal engineering at Banaras Hindu University in Varanasi, India.

1955
GERALD E. HOOPER, formerly a research engineer with Cary Instruments, is now a development engineer for Varian Associates in Palo Alto.

1956
JEREMY F. CROCKER is now a machinist with the Benda Tool and Model Works in Berkeley. He was previously a teacher at Palm Springs High School.

1957
EDWIN X. BERRY has joined the National Science Foundation in Washington as program manager in the weather modification program of the division of environmental systems and resources. He was formerly with the Desert Research Institute in Reno.

1958
HAROLD K. FORSEN, MS '59, now manager of engineering for Exxon Nuclear Company, Inc. in Bellevue, Washington, is on leave from the University of Wisconsin, where he was director of the physical sciences laboratory.

RICHARD F. HERLEIN, MS '59, is now a private consultant in Mill Valley, California.

1959
LANNY L. LEWYN, MS'60, is now a guest scientist at the German Institute for Satellite Electronics in Oberpfaffenhofen where he heads a project for developing an implantable bio-telemetry unit and ground station. He used to be supervisor of the nuclear instruments group at JPL.

1962
CHARLES F. STEBBINS, MS, AE'63, a major in the U.S. Air Force, is attending the Armed Forces Staff College in preparation for a position in a command involving another country or military service. He previously was assigned to Tan Son Nhut AB, Vietnam.

1963
GERALD D. CHANDLER, formerly a member of the technical staff of RCA Labs, is now a professor of informatics at the Ecole des Mines in Nancy, France.

EDMUND E. SPAETH, MS, PhD'67, is now director of applied research for Pharmaseal Laboratories in Glendale. Previously he was with Washington University in St. Louis.

1965
JOHN BEAMER, formerly an assistant professor at Clarkson College, is now a medical student at the University of Miami.

Raymond F. Harless, MS'43 (left), deputy commissioner of the Internal Revenue Service, receives the IRS Commissioner's Medal from commissioner Johnnie M. Walters in Washington, D.C.

GERALD D. GOWEN is now manager of advance manufacturing engineering in the mobile radio department of the General Electric Company in Florence, South Carolina.

1967
YU-WEN CHANG, MS, finished his postdoctoral research at UCLA and is now a senior engineer at the Westinghouse Research and Development Center in Pittsburgh.

TERRALL M. DE JONCKHEERE, MS, formerly an operations research analyst with the Army, is now a systems engineer for the Ford Motor Company in Dearborn, Michigan.

ROBERT J. MILLER has received his PhD in chemistry from UC Berkeley, has married the former Charlotte Fung, and is now in his first year of medical school at the University of Wisconsin.

STEPHEN A. MUSCANTO, MS, has joined Burroughs Corporation in Goleta, California, as manager of management systems.

PAUL F. WILLIAMS completed his graduate work at USC and is now with Bell Laboratories in Murray Hill, New Jersey.

DAVID R. WOODWARD was married to Kelera Lawalevu of Levuka, Fiji, in June 1971, while he was serving in the Peace Corps in Fiji. Last year he and his wife returned to the United States. He earned a master's degree at Harvard and is now working on his doctorate in education in educational planning at Harvard.

1968
PAUL S. BRANDON is now an instructor of business economics at the Graduate School of Business of the University of Chicago. He finished his graduate studies at Harvard.

RANDALL B. COOK, formerly a chemist with Cary Instruments, is now a chemist with Varian Associates in Palo Alto.

JOHN S. DANCZ, who has been doing research in physics at Manchester and Cambridge Universities in England, has accepted a postdoctoral fellowship in chemistry at MIT.

JONATHAN A. KING, PhD, is now an assistant professor at the Massachusetts Institute of Technology. He had been a visiting scientist at M.R.C. Lab for Molecular Biology, Cambridge, England.

S. ROCK LEVINSON is now a graduate student at Churchill College, Cambridge University, England.

ROGER J. RADLOFF, PhD, is now an assistant professor at the University of New Mexico School of Medicine in Albuquerque. He was a postdoctoral fellow at the University of Wisconsin.

ARNOLD L. SHUGARMAN, PhD, is now president of Bayport Industries, Inc., Santa Ana.

1969
JEFF HECHT has completed his graduate work at the University of Massachusetts and is now an associate technical writer with Honeywell Information Systems in Waltham, Massachusetts.

WEN-KUAN LIN, PhD, formerly with the Center for Nuclear Research in France, is now a research fellow in the department of physics at Baylor University in Waco, Texas.

BENJAMIN RON, MS, is now vice consul for scientific affairs in the Consulate General of Israel in New York. Previously he was a senior officer in the research and development department of the Israeli Army.

STEPHEN E. SAVAS, formerly an associate mathematician with Aerojet General, is now a graduate student in physics at UC Santa Cruz.

AUGUST L. SCHULTZ, MS'70, a first lieutenant in the U.S. Air Force, has completed pilot training and has been assigned to Elgin AFB, Florida, with the Tactical Air Command.

1970
LAWRENCE L. BOGEMANN, MS, was graduated from the U.S. Air Force test pilot school at Edwards AFB, California.

Lawrence L. Bogemann, MS'70

DONALD M. BURLAND, PhD, has completed his postdoctoral work with the Kamerlegh Onnes Lab in The Netherlands and is now a research staff member with IBM in San Jose.

CORNELIUS O. HORGAN, PhD, formerly a lecturer at the University of Michigan, is now a senior research associate in the school of mathematics and physics at the University of East Anglia in Norwich, England.

JOHN B. JAMIESON, MS, is now a Parole Service Associate with the California Department of Corrections in Los Angeles.

CHONG SUNG LEE, PhD, is currently an assistant professor in the department of Zoology, University of Texas.

ADRIAN C. SMITH, now in his third year of graduate work in physics at Cornell, was recently married to Nina Jean Rogers in Salinas, Calif.

1971
THOMAS M. BARTSCH, MS, graduated from the flight test engineer course of the U.S. Air Force test pilot school at Edwards AFB, California, and has been assigned to the 6510th Test Wing there.

JUDITH L. ERB, MS, is a biochemistry research associate with the Lafayette Clinic in Detroit.

WEI-TOU NI, MS, is a research associate at Montana State University in Bozeman.

OBITUARIES

1921
JESSE ARNOLD in February. He had retired from the U.S. Geological Survey, California District, and was living in Sebastopol, California.

1930
NORRIS JOHNSTON, PhD, on December 19, 1972, in Ojai, California. He had retired as vice president for research of Mineral Concentrates, Incorporated. He is survived by his wife and three children, including DAVID JOHNSTON, BS'53, and JOHN B. JOHNSTON, BS'51, PhD'55.

1931
JEFFERY A. WINELAND, February 24, in Sacramento. Recognized as the father of the state aqueduct system in California, he had retired in July 1972 after 40 years as a state and federal engineer and planner of water resources. He is survived by his wife, Laura; son, David; and daughter, Judith Delbon.

1938
DONALD R. WARREN on January 16, of cancer. He was president of Donald R. Warren Company, Los Angeles. He is survived by his wife, Lora, and their son.

1960
DAVID L. GOFF in Van Nuys, California.

1970
KEITH A. EDWARDS on February 9, of injuries suffered in a climbing accident near Yakima, Washington. He was a graduate student at the University of Oregon. He is survived by his parents, Mr. and Mrs. Ronald S. Edwards.