

ABANDONED MINE OF THE FUTURE—Asteroid 1976AA, the first one ever found with an exclusively Earth crossing orbit. INSET—left, Geology Prof Gene Shoemaker; right, Planetary Scientist Eleanor Helin.

## Asteroids a 'Mother Lode of Future'

Of the thousand or so asteroids looping around the sun and crossing the orbit of earth, at least several dozen could represent excellent targets for exploration, as well as a mother-lode for future space miners, say two Caltech scientists.

Planetary scientist Eleanor F. Helin and Professor of Geology Eugene M. Shoemaker have reached this conclusion after a four-year systematic search for "planet-crossing" asteroids, particularly those that cross the earth's orbit, known as "Apollo" objects. Based on their discoveries during this search, as well as other data concerning asteroids, they predict that numerous asteroids will be detected with suitable orbital characteristics for easy rendezvous with space ships, as well as high enough mineral content for profitable mining.

Among the Caltech scientists' most significant discoveries is "1976AA," a thousand-meter-diameter asteroid discovered in January 1976, which the scientists described in the August 1977 issue of *Icarus*. This was the first asteroid ever discovered which is exclusively earth-crossing. Its orbit stays relatively close to the earth's. It was this asteroid that led the scientists to predict that a population of such bodies will likely be found in future searches. Newly discovered asteroids are designated by the year of discovery, plus a two-letter code which indicates the time of year.

Shortly after the 1977HA discovery, another Apollo, 1977HB, was discovered by Caltech astronomer Charles Kowal. Recent orbital calculations reveal this asteroid to be the best candidate for a space mission.

To be a good mission candidate, such an object must have an orbit approximating that of earth. It must also move in approximately the plane of the earth's orbit, so that a spacecraft will need to use little fuel to boost itself from the earth to the asteroid.

To be profitably mined, such

an object must also be rich in iron/nickel compounds, silicon/aluminum compounds or other useful materials.

If it is true, as one space colony proponent has contended, that a 100-to-200 meter asteroid could provide earth with enough iron and nickel to last for years, then some of the asteroids discovered in Helin's searches should make her one of the most successful prospectors of all time.

Recognizing the potential of the Caltech scientists' discoveries, space colony advocates invited Mrs. Helin to participate in last summer's NASA-sponsored space industrialization study. There, she presented her results and made recommendations for an expanded asteroid search program to assure the availability of asteroids with the right orbit and composition for space mining operations. Also, the NASA-sponsored Near Earth Resources Summer Workshop, held in August at the University of California at San Diego and attended by Professor Shoemaker, recommended that such asteroid search programs should be speeded up.

"Although I was conservative at first about feasibility of some of the space colony advocates' concepts," said Mrs. Helin, "after working with them I'm convinced that their mining colonization schemes could be accomplished. I'm also convinced that a stepped-up asteroid search program will increase the discovery rate of qualified candidates to give a basis for realistic planning.

According to Mrs. Helin, the asteroid program, funded by NASA's Planetary Geology Program, was not begun with futuristic plans for mining or colonization, but to estimate the populations, size distributions, and collisional lifetimes of the earth-crossing objects. Such information would allow a better understanding of the history of the earth and neighboring planets.

The Caltech scientists are also interested in the asteroid search

because the earth could possibly be struck by one of the objects in the future. However, they point out, the possibility of such a collision is extremely small, even over a period of many centuries.

"Many believe that a megaton-sized explosion that devastated a remote area in Siberia in 1908 was a comet entering the atmosphere," said Mrs. Helin. "And several of our discoveries have been objects which pass relatively close to earth, in terms of astronomical distances. As we detect more and more near-earth objects; we can calculate more precise estimates of asteroid populations and predict more reliably how often our planet might suffer an impact from one of these near-earth bodies," she said.

Mrs. Helin recalled one tense

Continued on Page Four

### UCLA Trip Refreshing too

## Ricci Concert a Refreshing Change

Last Sunday I trekked down to UCLA to hear a concert in Royce Hall. (Even if you never go to concerts, the trip to UCLA will do you good. They have a vast, beautiful campus that is well worth seeing.) Henri Temianka and the California Chamber Symphony were appearing with violinist Ruggiero Ricci. Being a violinist myself, I just could not turn down the opportunity to hear someone as great as Ricci.

For the first selection, the symphony performed Antonio Vivaldi's *Concerto in A Major for Strings and Continuo*. It was beautiful. The orchestra is just the right size (35 musicians) for this type of music. Larger orchestras tend to butcher the music with loudness rather than present it the way it was written. The second selection came on a sad note. One of the principal violinists of the orchestra, Mary Ann Rinngold, passed away over the summer. Temianka an-

## Alan Perlis Will Occupy New Tech Computer Chair

The Gordon and Betty Moore Professorship of Engineering has been established at the California Institute of Technology, and Visiting Professor Dr. Alan J. Perlis, who is Eugene Higgins Professor of Computer Science at Yale, has been named as its first occupant.

The chair is named for Dr. Gordon E. Moore, president and chief executive officer of Intel Corporation of Santa Clara, California, and his wife Betty, who are endowing it.

"We are grateful for the support of Dr. and Mrs. Moore, which is a key factor in Caltech's move to remain at the leading edge in computer science," Dr. Christy said. "And we are fortunate in having Dr. Perlis as the first occupant of the new chair. He brings to the Institute a record of pioneering contributions to the field of computer technology which will enhance our emerging computer science program."

Caltech's effort in computer science brings together the engineering technology of integrated circuit design and the advanced concepts of programming for the new generation of computers which will be built in the future. Computers with nearly 1,000 times more capacity than at present are possible because of the increased capability of computer hardware that uses solid-state devices. "Computer science is a central technology in tomorrow's engineering, and Caltech will be at the center of this work," Dr. Christy added.

Dr. Perlis, who arrived at Caltech this month, is an internationally recognized authority on computers and computer language. He is active in government committees on computing science and has written many scientific papers and books on the subject. He is past president of the Association for Computing Machinery and was editor of its journal from 1958-1962.

## ASCIT ELECTION RESULTS

### RUNOFFS TODAY

<b>ASCIT Athletic Manager</b>		<b>Junior Class Treasurer</b>	
Ed Chan	*47	Jeff Copeland	8
Steve Toner	*27	Robert Yamashita	6
<b>Senior Class President</b>		Other	16
Joe Zwass	**29	No	**10
<b>Senior Class Vice-President</b>		<b>Sophomore Class President</b>	
Ed Bielecki	**24	Jim Fruchterman	**42
<b>Junior Class President</b>		<b>Sophomore Class Secretary</b>	
Paul Guttierrez	**31	Eugene Loh	*39
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Mark Wold	*27	<b>Sophomore Class Treasurer</b>	
Neil Cotter	*5	Walter Coole	*20
<b>Junior Class Secretary</b>		Mike Suzuki	*20
Other	31		
No	**10		

\*Means candidate in runoff  
\*\*Means winner

nounced that Johan Pachelbel's *D Major Canon* would be played as a memorial to her. I don't believe that he could have picked a more fitting piece.

Before the third selection, Mozart's *A Major Symphony*, Temianka gave a mini-lecture to the audience on the techniques Mozart used in the symphony and other works that he had based on a theme found in the symphony. He even gave some short demonstrations on the 1st Violinist's violin. It was quite refreshing to find a conductor doing more than merely conducting. Temianka's style actually helps to enlighten the audience about the music and give them a deeper understanding of it and I applaud him for that.

After the intermission, Ruggiero Ricci came out on stage and Temianka talked about some earlier violinists: Paganini, Kreisler, and Ysaye who had had to write their own music due to a lack of solo violin music in the nineteenth century. Ricci played

Fritz Kreisler's *C Major Violin Concerto* and Eugene Ysaye's *Concerto No. 8 in B Minor*. There is no other word but excellent to describe the music and the performer.

As encores, Ricci played Niccolò Paganini's *Moto Perpetuo* flawlessly and relativistically fast. After a standing ovation he was forced to play another work by Paganini. As soon as he was finished the entire audience was on its feet applauding. This went on for several minutes until it was clear that he was through for the night.

If this has sold you on classical music, or even if it hasn't but you would like to experiment, the next California Chamber Symphony concert of the season is on December 11 at 8 pm in UCLA's Royce Hall. Featured will be Violinist Aaron Rosand in works by Bach, Mozart, Bliss, and Wieniawski. Call-658-8944 for more information.

David Ritchie

# News Briefs

### Let's Get This Over With, Okay

Runoffs for ASCIT Ath Manager, Junior Class Vice President, Sophomore Class Secretary, and Sophomore Class Treasurer will be held today, October 21. You have been duly warned.

### Japanese in One Easy Lesson

This Saturday, at 7:30 pm in Baxter Lecture Hall, Cinematech is showing *The Seven Samurai*. The dialogue is in Japanese with English subtitles. Donation: General—\$1.50, ASCIT and GSC—\$1.00, children under 14—\$.75.

### Ride On

The cycling federation will be leaving for Chantry Flats Sunday morning at 7:30 from the Quad south of Winnett. Anyone interested is welcome. For information, contact Dave Sivertsen, Ricketts or Jon Ostborne, x1587.

### Who Was That Masked Ship?

This Saturday, the Caltech Gamers will hold a naval miniatures game starting at 7:30 pm in Dabney Hall Lounge. We will be re-creating the chaos of an American-Japanese night action. All are welcome.

### Caltech Y

### Beware: Friday Falls on A Sunday This Week

Come to the ASCIT Movie, *Lolita* this Sunday, October 23, at 7:30 and 10:10 pm.

### GDG Needs Your Support

So far this year, the Gay Discussion Group has encountered declining interest in its activities. We would like to make an appeal to all those in the Caltech community who value the presence of such a group for their support and participation. We feel there is a real need for a group such as ours whose active involvement in the community, providing dialogue and promoting human understanding, can benefit many people, not just those of us who happen to be gay. If you agree, please attend our next meeting, Tuesday, October 25 at 7:30 pm in the Y Lounge.

### Managerial Opening

Due to the unprecedented second resignations of Kellner and McCorquodale, the office of *Tech* editor is vacant, and nominations are now open. All nominations should be posted on Flora's door in Winnett.

# Letters to The Tech

### Sundial

To the Editors:

It is indeed unfortunate that the person or persons who were responsible for the disappearance of the Sundial knew so little about sundials. It is my understanding that this sundial was designed by Russel Porter, and I'm sure few people know that there are two scales for this particular sundial. The scales are changed twice a year to compensate for the earth's changes with relation to the sun.

Since Central Engineering Services has for many years been responsible for changing the scales, I have no idea what I'll do on December 21.

Very truly yours,  
*Norm Keidel*

Manager  
Central Engineering Services

### Bakke Is Right

To the Editors:

Kent Daniel's commentary in the *California Tech* last Tuesday regarding the Bakke case flits around the real point in the Bakke case without ever making any real points on its own merit. Bakke brought a law suit against UC Davis Medical School because they had a discriminatory program of admissions using a quota system. Under the present system, a given number of spaces are reserved for minority students regardless of the qualifications of other non-minority students. Daniel fails to mention this. In certain cases their educational background is inferior to that of non-minority students. A quota admissions system, though, will not and has not remedied this situation.

The Tech welcomes expression of opinions from readers. Letters should be kept as brief as possible and are subject to condensation. Address all letters to the California Tech, Winnett Center, Caltech 107-51.

Admissions committees certainly have a right to look at a person's background and take into account that his educational background is inferior because he is a minority student. They may then admit him because of some of his other redeeming points, but they do not have the right to say that a fixed number of minority students will be allowed to attend their institution each year. The only solution to the problem is to carefully screen each application, taking into account all points regarding each student as a human being rather than as a member of a minority or a non-minority group. We abhor the way Daniel makes Bakke out to be a spoiled brat who is crying to the Supreme Court. He certainly is not. He was ripped off by the quota system and has every right to complain. We applaud his courage in facing the controversy almost singlehanded.

*David S. Bradburn*  
*Anne L. Erdmann*  
*William E. Henslin, Jr.*  
*David B. Ritchie*

To the Editors:

Your editorial regarding the Bakke case is superfluous and misleading since it obscures the basic constitutional issue. This issue is best summarized by a quote from a brief prepared by the Anti-Defamation League in 1973 for another U.S. Supreme Court reverse discrimination case: "For at least a generation the lesson of the great decisions of this Court and the lesson of contemporary history have been

the same: discrimination on the basis of race is illegal, immoral, unconstitutional, inherently wrong and destructive of democratic society. Now this is to be unlearned and we are told that this is not a matter of fundamental principle but only a matter of whose ox is gored. Those for whom racial equality was demanded are now to be more equal than others. Having four support in the Constitution for equality, they now claim support for inequality under the same Constitution."

*Stefan Demetrescu*

To the Editors:

I must disagree with nearly the entire body of Kent Daniel's treatment of the Bakke case at the University of California court case (*The Tech*, Oct. 18, 1977). Although many of his comments are aesthetically pleasing in their own isolated system, when placed in the context of the actual nature of the case and the constitutional issues involved, fallacies are readily seen.

Daniel reduces what he calls "one of the most controversial cases of the decade" to a rather simplistic scenario. With absolute view no references to support his view, he declared that since Bakke was refused admission to nine other medical schools, Bakke's case is "fallacious." Quite to the contrary, as Howard Squadron of the American Jewish Congress, an organization which has aligned itself with the Bakke position, stated on the *MacNeil/Lehrer Report*, the "record shows that Bakke was found by his interviewer as a very desirable applicant and then was rejected."

Second, Daniel implies that  
**Continued on Page Three**

# Campi In Concert Today

■ Today: Ray Campi and the Rockabilly Rebels will be appearing in the quad. They've taken time out from their busy

schedule (which includes appearances at the Starwood) to give a noon concert here. Be sure to come by and check them out.

■ Monday, October 24: John Andelin, alumnus, former Ricketts R.A., and currently science consultant to the U.S. Congressional Committee on Science and Technology, will talk on "My Life as a Hired Gun: A Teacher's Life in Politics." Come to Winnett Lounge at 8:00 pm to find out what it's like to be a government consultant.

■ Tuesday, October 25: Fred Shair will be appearing in a noon discussion in the Y lounge. The topic is "Smog—Look and Weep" and Dr. Shair will be talking about his recent observations in the L.A. basin.

■ Next Friday, October 28: The Caltech Dixieland band will give a noon concert.

■ Saturday, October 29: Bill Schaefer and Dave Wales will lead a day hike to Mount Baldy. The Y will provide transportation. Please sign up in the Y office before next Friday.

*Bert Wells*

## the california TECH

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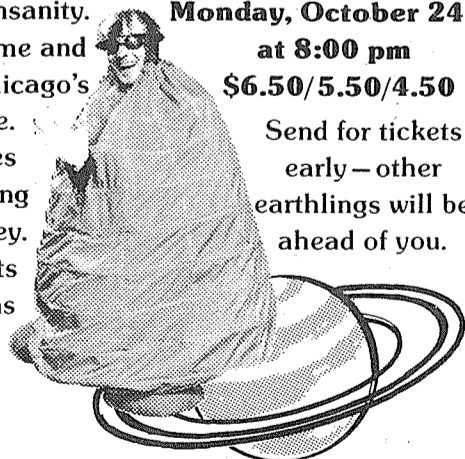
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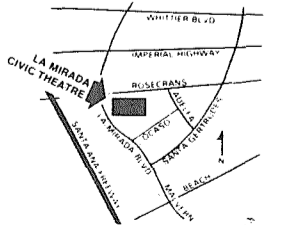
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# LETTERS TO THE TECH


Continued from Page Two  
 the Constitution should be ignored so society can arrive at expedient solutions to the problem of racial discrimination. The Supreme Court exists to determine if a given law or its application is unconstitutional, not to determine if the procedure will result in the poorly-defined state of "social justice." Additionally, the DeFunis vs University of Washington case, which involved the denial of an applicant's admission to law school on similar grounds, was presented to the Supreme Court

a few years ago. The Court sidestepped the issue by declaring it moot, for DeFunis had already been graduated from another law school, but Justice William O. Douglas filed a separate opinion, from which I quote:  
 "The equal protection clause commands the elimination of racial barriers, not their creation in order to satisfy our theory as to how society ought to be organized. The purpose of the

University of Washington cannot be to produce black lawyers for blacks, Polish lawyers for Poles, Jewish lawyers for Jews, Irish lawyers for Irish. It should be to produce good lawyers for Americans and not to place barriers against anyone."  
 A special admissions program that involves race as a factor in admissions is clearly unconstitutional. What is required is consideration of individuals based on their own merits, not the selection of some ass because he is "more equal" than a donkey.  
 Lloyd A. Wheeler

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# MOTHER LODE OF THE FUTURE

Continued from Page One  
 period of a few hours' duration several years ago when preliminary calculations on an object the scientists had discovered suggested that its orbit placed it on a collision course with earth. After further calculations, however, the scientists concluded that the object was actually orbiting the earth, not the sun, and was therefore probably the remains of a rocket launch, perhaps a discarded fuel tank. But such an episode points up the fact that if such a large cosmic object were discovered to be on a collision course with

earth, there is no means of averting such a catastrophe.

Although the asteroid 1977HB is currently the best candidate for rendezvous and exploration, and perhaps mining, many more such bodies with similar or better orbits must be found before a convincing conclusion about the economics of space mining can be made, said Mrs. Helin. To find these objects, Helin and Shoemaker are seeking an expanded search program that would include larger telescopes and greater coordination with other astronomers around the world.

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