



Mould Measures Mass — Universe Growing

by Glenn Tesler

In 1928 at the Mount Wilson Observatory, Caltech's own Edwin Hubble discovered that the universe was expanding at a uniform rate after observing that light from distant galaxies seemed to be red shifted by an amount proportional to the distance of the galaxy from the earth. Caltech Associate Professor of Astronomy Jeremy R. Mould, Ph.D., described refinements on Hubble's observations as well as the science of cosmology that sprung from them in the final Watson lecture this term.

The Cosmological Principle states that the structure of the universe should appear the same for large scale structures throughout the universe; even before this principle was formulated, it was assumed that all galaxies are composed of the same materials, but in different quantities. By assuming that all mass in a galaxy radiates light, and that the intensity of light radiated from a galaxy is proportional to the galaxy's mass and decreases as the inverse square of the distance from the galaxy, astronomers have been able to measure the mass and distance from earth of other galaxies in the universe by analyzing the light they emit. Since the color of light radiated from a star is related to its temperature, these observations can also be used to determine the temperature and composition of stars.

Most galaxies contain regions consisting of red balls of glowing gas, excited by the stars inside them. These regions are believed to be the same size in all galaxies, so that their distance to earth should be in direct proportion to their apparent size as measured from the earth. This measurement technique only works within a limited distance from earth, however, so techniques that work over a larger scale have been developed.

According to Hubble's observations, all galaxies in the universe tend to recede from each other at a velocity proportional to the distance between them. However, the gravitational attraction between galaxies that are sufficiently close to each other is often enough to overcome this tendency. Thus, while the universe as a whole is ex-

panding, groups of galaxies within it may be contracting. Mould described in detail several scales of distance over which this gravitational attraction is significant. The fact that deviations from uniform expansion do occur can be used to determine the mass density in different parts of the universe. This, in turn, highlights to a flaw in the measuring techniques described above that assume the mass of a galaxy is proportional to the intensity of the light emitted from it, for it is believed that "dark matter" exists that can contribute to the mass of a galaxy without emitting light. If the density of mass, including dark matter, throughout the universe can be determined more precisely than it has been, then Hubble's Constant (the ratio of the velocity of the most distant object to its distance) can be more accurately determined, and this, in turn, can lead to an accurate estimate of the age of the universe. Many techniques and teams of researchers have been employed to try to determine Hubble's Constant and the age of the universe, and all have yielded dissimilar results.

Measurements of mass density and distances of objects from earth may be improved by experiments that have been proposed for future space flights. A space telescope, to be launched from the shuttle, will be able to measure these quantities with more accuracy than telescopes located on earth. JPL's proposed "Tau" mission could improve cosmological measurements even more. A vehicle with a telescope and lots of other devices would be launched from earth and would have a thrust that burned for ten years, allowing it to escape from the solar system. Then, it would drift out another forty years until it is 1000 times farther away from the sun than the earth is. By correlating the measurements it makes with those made here on earth, distances to stars could be computed with much greater accuracy than they can be now.

Dr. Mould was born in England, and went to the University of Melbourne, Victoria in Australia. He received his Ph.D. at the Australian National University in Canberra. He emigrated to the United States in 1976 and worked at several observatories before joining the Caltech faculty in 1982.

about how development works.

The Lucille P. Markey Trust, established in 1983, places its major emphasis on supporting interdisciplinary efforts by small groups of investigators who are addressing fundamental questions in biomedical science judged to be of great importance. In January, 1986, the Trust granted Caltech \$12.5 million for studies in developmental biology.

"The Markey Trust's generous support will be indispensable in our continuing efforts to create at Caltech a world-class center for developmental biology research," said Caltech President Marvin L. Goldberger. "The study of development is one of the most important areas of basic biological research and we expect this conference to serve as a catalyst for further great advances in the field."

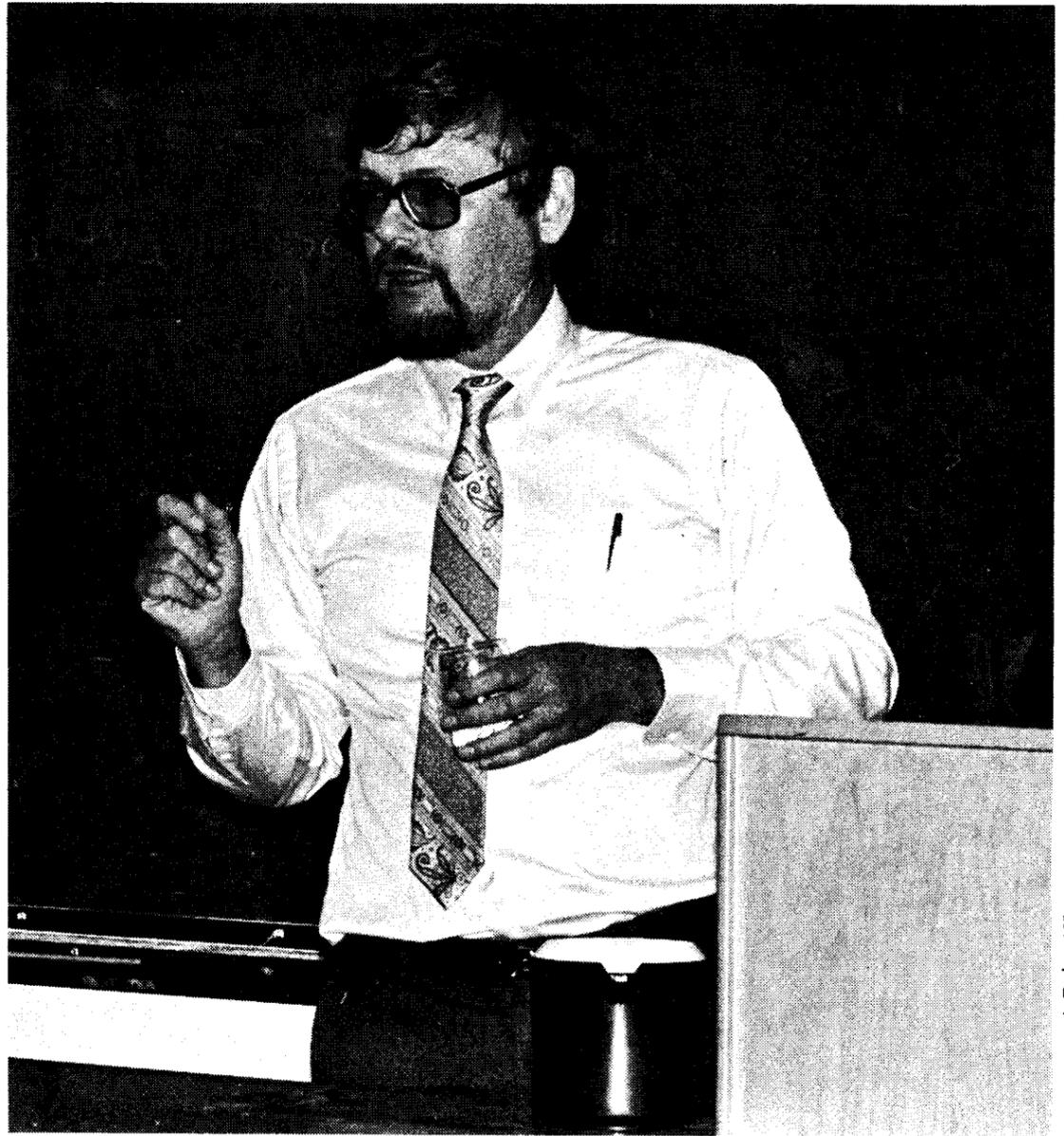


photo by Mark D. Looper

Author Gregory Benford tells what science and scientists look like through the lens of science fiction. Benford, author of the sci-fi classic *Timescape*, is a professor of physics at the University of California, Irvine.

Fiction and Science: Oxymoron? Gregory Benford Answers "No"

by Mark Looper

"You cannot do what you have not first imagined," said Nebula-award-winning science fiction author Gregory Benford to an audience of 65 in Gates Building last Wednesday night, and the function of science fiction is to provide this imaginative foresight. Dr. Benford, a professor of physics at UC Irvine, is the author of the classic *Timescape*. His most recent work (with David Brin) is *Heart of the Comet*. His talk, titled "Science, Fiction, and Things In Between," was sponsored by the Caltech Y.

Science fiction, he said, at first seems to be a contradiction in terms. After all, "science stands for truth in this society," and any definition of "fiction" boils down to "falsehoods for entertainment." So must we conclude that science fiction, i.e. fiction about science, is "lies about the truth?" Of course not. But the reason is lost on most people. "Science," properly speaking, is not a body of Truth, but rather the method of theorizing, testing, and elimination whereby we try to attain ever more accurate predictive models for natural truths. Therefore, science fiction is fiction about the process of finding truth, and about those people, scientists, who advance this process. Actually, much modern science fiction is concerned more with the reactions of non-scientists to the science and discoveries that make their fictional worlds different from our world. The subset of science fiction that deals with scientists and the process of science

directly is usually referred to as "hard" science fiction, and Dr. Benford is a strong exponent of this subgenre. "Hard" science fiction, over and above its imaginative function, can also be directly predictive. For example, it was in a "hard" science fiction story that Arthur C. Clarke first proposed the idea of a geosynchronous communications satellite. Thus science as it is seen by scientists, i.e., as a process, is both reflected in and anticipated by this subset of science fiction.

However, as Dr. Benford said, the distinction between science and Truth-with-a-capital-T is lost on most people, as for example in the Louisiana creationism law, which sought to distinguish between "proven scientific fact" and "evolutionary theory." This attitude holds that there is some arcane thing called Scientific Truth, which is accessible to the initiates called scientists but which might as well be magical as far as most users of its technological results are concerned (how many people can explain the principles behind an airplane wing's lifting power, let alone behind a computer?). To put it another way, Arthur C. Clarke made the famous comment that "any sufficiently advanced technology is indistinguishable from magic." Dr. Benford observes that our rapid technological advance has carried most people into the domain of applicability of this statement. The analogy between technology and magic for most affected people does not take the form of superstitious awe, but

rather of alienation, a feeling of a loss of control over major aspects of their worlds. Control has been delivered into the hands of scientists and engineers rather than of the gods and demons of magic, but the loss is the same. Dr. Benford, partisan of "hard" science fiction that he is, thinks that the growth of this alienation may have shown itself in literature as part of the explanation for the recent rise in popularity of fantasy, that relative of science fiction which deals with overtly magical or otherwise impossible worlds. For example, the first edition of J. R. R. Tolkien's classic fantasy *The Lord of the Rings*, written thirty years ago, before such terms as "future shock" were in common use, was re-mandered at the publishers, but nowadays fantasy accounts for perhaps half of what you'll find in the "science fiction section" at bookstores. For decades, detractors have called science fiction and fantasy "escapist." Yet Dr. Benford maintains that there is an important difference between escaping from the real world into fantasy and escaping to a plausible future world in a "hard" science fiction story to exercise the intellect and the imagination and to envision possible outcomes of actions even now taking shape or taking place in the real world.

This talk was sponsored the the Caltech Y, not by SPECTRE, the Caltech Science Fiction Society. But SPECTRE will bring you the next science fiction speaker, or die trying. See "What Goes On" for our next meeting.

Biology Symposium

[CNB] From 11 March to 13 March 1987, Caltech hosted an important scientific conference on "Cell Lineage and Specification in Development." Twenty-seven scientists addressed over 300 attendees at the symposium, which marked the inception of the Lucille P. Markey Charitable Trust Program in Developmental Biology at Caltech.

The symposium presented new results regarding molecular, cellular, and genetic processes underlying normal development. Progress in this field is occurring at an unprecedented rate, in part because of the advent of powerful new technologies, including recombinant DNA, monoclonal antibodies, and advanced methods of introducing these into developing systems. Such studies are providing major insights and ideas

LETTERS

OPINION

Controversy Continues

To the Editors:

As members of the Board of Control, we feel obligated to correct some errors and answer some questions which were brought up in letters in last week's *Tech*. It should be noted that this letter's contents are strictly our own opinions and are not an official board statement.

Two questions were asked in Jennifer Low's editorial. First, she asks if the Board realizes the impact their judgements have. The implication is that the board acts casually because Board members don't care about the consequences of their decisions. This couldn't be farther from the truth; no one, Board members included, likes making harsh recommendations. Nevertheless, they must sometimes be made.

She also wonders how the rest of the outside world will react to a Board action. This question implies that outsiders will find out that someone was BOCed. This will not happen unless the convicted person makes his case public. No record of a BOC conviction is ever made on a transcript or any other Caltech document. Leaves and expulsions are recorded as "voluntary withdrawals."

Frank Vasquez's letter largely concerns a specific board action which, according to the ASCIT bylaws, we are not allowed to discuss. In his general discussion, he states that "if the BOC's primary function is to nullify advantage, and I am under the impression that this is so..." This is only partially correct. In addition to "nullifying advantage," the board acts to protect the Caltech community from those it feels will commit future honor system violations. This is by far the most serious responsibility of the Board.

Shubber Ali's letter contains several statements which we disagree with. First, he suggests that house affiliations may bias board members. While no one can ever be totally unbiased, we have seen absolutely no evidence of such problems on the board.

He proposes that BOC elections be campus-wide rather than done

on a house-by-house basis. While this is a matter of debate, we would like to point out that the reasons for electing "house" representatives are twofold: people are more likely to know (and trust the judgment of) the people they elect, and the representatives are spread throughout the campus, making them more accessible to the student body. Campus-wide elections often produce a disproportionate number of officeholders from some houses. (Note, for example, that a majority of the ASCIT BOD come from one house.)

He indicates that the Dean does not have access to the "unedited version of the minutes of the case." There is no such thing as "edited" and "unedited" versions of the minutes. There exists only one set of notes from a case, which the Dean can see after the completion of the case.

Finally, there is the issue of talking to a friend who has committed a (potential) honor system violation rather than immediately turning them in to the Board. We see nothing wrong with such discussion, as long as the case is eventually reported by someone.

Remember, the honor system is completely based on one principle: "No one shall take unfair advantage of any member of the Caltech community." This statement alone is the basis for all of the Board's decisions. With careful thought, no other rules are necessary.

-David Nice
-Nicole Vogt
Ricketts House

Chair[wo]man Shields Friends

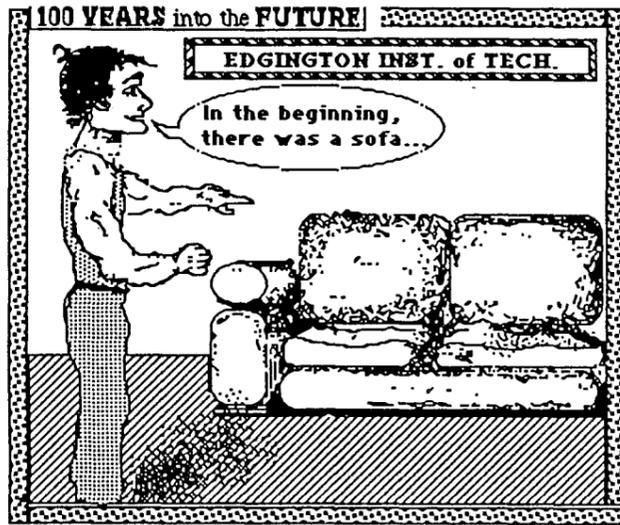
To the Editors:

After reading last week's letters to the editor on the BOC and realizing that I am not alone in my negative opinion of the Board and the Caltech Honor System, I too would like to comment on the subject. I will start by saying that I strongly believe that the BOC is a farce and I believe that I have good reason to make such a statement. Last year, as a Teaching Assistant, I happened upon a fairly serious "probable" violation of the Honor Code. It involved one or all of four Caltech students. A partially graded final exam was turned in along

with three other ungraded ones. The only possible explanation for this occurrence, in my mind, was that the partially graded exam was taken by some student from a T.A.'s mailbox and later returned. This was possible because the exam questions were split between T.A.s and some of the exams were passed back and forth between the T.A.s for grading via their mailboxes. Without my going into further details of the discovery of the violation, suffice it to say that it was fairly blatant. After reporting the incident to the Professor, I was told to bring the matter before the BOC. I proceeded immediately to contact the head of the BOC. Upon explaining the incident over the phone, I was asked to name the students that were potentially involved in the incident. The BOC representative proceeded to tell me that he/she knew the potential offenders "personally" (two or three of them lived in his/her own house) and he/she was sure that none of them would possibly have cheated or violated the honor code. I was incensed that such a remark was made by a presumably "impartial" Board member. I persisted on several occasions to stress what I believed to be an important case, but very little, if any, action was taken by the BOC.

Now I understand that Honor Code violations are difficult to prove and I understand the seriousness of my accusations. But I DO NOT understand how such a case as this could be dismissed up front with such a flippant, personal and biased remark from a Board member, while a case such as taking a couch can lead to the dismissal of a student.

It is both absurd and ludicrous for me to entertain the possibility that the present system is somehow ensuring that students do not take undue advantage of their fellow students. Despite the perhaps unusual and infrequent cases of cheating, the system at Caltech affords ample and frequent opportunities for "unfair advantage;" given how



lax the rules are in most cases for such things as late work and exams, some Caltech students take unfair advantage of their fellow students quite often.

I too enjoyed the freedoms of an honor code as an undergraduate at another university, but not once in my four years did I observe the blatant violations of the system that I observe on a daily basis at Caltech. I would also like to see some changes in the BOC and a sincere effort to correct the apparent bias in the system. Something is wrong with a system that ousts a student for taking a couch, but ignores cases of real dishonesty in academic achievements. I think that an honor system is a wonderful concept and I fully support all that it stands for and tries to accomplish, but at Caltech it is time for someone to take a more serious look at just how well the system is operating.

-Wendy L. Hansen
Grad Student, S.S.

GRB, BOC Ripe For Merger

To the Editors:

Interest in the Honor Code waxes and wanes, but now it is

THE CALIFORNIA TECH

Volume LXXXVIII • Number 21
13 March 1987

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Published weekly except during examination and vacation periods by the Associated Students of the California Institute of Technology, Inc. (but primarily by the Editors). The opinions expressed herein are strictly those of the authors and do not necessarily reflect those of the Editors.

Letters and announcements are welcome. All contributions should include the author's name and phone number and the intended date of publication. The Editors reserve the right to abridge and edit letters for expediency, literacy, or for any other damn reason they feel like. So there.

Turn in copy (preferably on an IBM-compatible, WordStar-formatted floppy disk) to the *Tech* office mailbox, room 107 Winnett. The deadline for copy is Wednesday at 5PM; for announcements, Tuesday at 5PM. Late copy may not be printed unless prior arrangements have been made with the editors.

Subscription requests should be directed to the attention of the business manager. Rates are \$3.00 per term, \$8.00 per annum (three terms), \$100 per life (many terms).

Printed by News-Type Service, Glendale, California

ISSN 0008-1582

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LETTERS

once again mainline news.

This time it's the Lloyd couch. A tricky case, this. Should the guilty parties be shot?

The emotional damage to the Lloyd house victims is incalculable. The crime is despicable. And, after all, the guilty ones are Flems. It all adds up to a resounding YES!!

Or so it seemed to the BOC. They just could not resist. They had the power, and they exercised it.

At a distance, however, this all seems a little unfair. The big Red Machine is just no match for the BOC. I suggest therefore that the BOC should be neutralized somewhat, by merging it with the Graduate Review Board. The Graduates have no prejudice whatsoever, and view the Honor Code with truly open minds.

—Brian J. Warr
Gradturkey in Physics
452-48

**BOC Protects
But Take Care**

To the Editors:

While a student at Caltech, I served as BOC rep for Blacker House ('80-81). A couple of things occurred to me while reading the discussion in last week's *Tech* about the role of the Board in the expulsion of a particular student.

Frank Vasquez raised the point that expelling the student in question did not serve to nullify the unfair advantage taken by that stu-

dent. That's true, but the Board is obliged to do more. The recommendations made to the Dean by the BOC must nullify any unfair advantage, and they must also protect the Caltech community. Knowing nothing about the case beyond what was in last week's *Tech*, I assume that the Board recommended expulsion because they judged the student incapable of living within the Honor System. Vasquez states that making such a judgement about a person, about his being "guilty in the future," does not belong at Caltech. I disagree. Nothing would be more damaging to the Honor System than the presence in the community of people who would or could not abide by it. During my time on the Board, no one ever came before us that I believed fundamentally could not live within the Honor System. I have met plenty of people outside of Caltech that couldn't. I don't know if I would have agreed with the current Board on the case in question—I don't know anything about it. But to abolish the power of the Board *in principle* to remove such people from the community would be a big mistake. The Honor System is based on trust. If there are a significant number of students at Caltech who can't be trusted, the Honor System will not work. Period.

Shubber Ali claims the most important flaw in the Honor System is that it requires people to rat on their friends. If I were hearing a case before the Board, I would see a big difference between someone who said "I was trying to convince him to turn himself in when

the BOC found out," and someone who said "Cheating on a test is not nearly as bad as turning in someone to the BOC." The attitude reflected in the first is basically supportive of the Honor system. The attitude in the second is not. The Board would treat these two cases quite differently, even if it judged that both were Honor system violations.

Having said some things in support of the Board, I would like to mention some concerns I have about the Board itself, and the Honor system in general. Specifically, my concern has to do with the Board's hearing of non-academic cases. When I was on the Board six years ago, we heard a lot of non-academic cases. At the time, I thought each of these cases, considered by itself, should have been heard. But by the end of my term I was convinced that the BOC was having to deal with too many such cases. From what was said last week in *the Tech*, I don't think that has changed.

Historically, the Board, and the community at large, took a much narrower view of the types of cases the BOC should hear. Forty years ago, the majority of the cases the Board heard were academic ones. Many of the problems the Board has been dealing with more recently (over the last decade or so) used to be resolved in other ways—person-to-person, within the houses, by the MOSH or the Dean, etc. I think an overly legalistic interpretation of the Honor system has led people, both on and off the Board, to expect all conflicts to be resolved by the Board. That is neither possible nor reasonable.

As a practical matter, the Board can't do it. It doesn't have the time. The Board I served on often was operating near its capacity, given the constraint that all its members are full time students. The most

disturbing thing about this overload was that I realized there was the potential for many times more such non-academic cases. Most conflicts are still resolved by means other than the BOC. If everyone decided it was their "right" to have the Board deal with all the problems they had where some kind of unfair advantage could be construed, there would certainly be enough cases to swamp the Board.

The case that prompted this controversy illustrates another problem with having the BOC resolve everything. If the Board spends most of its time on cases where no clear consensus exists in the community (which are mostly the non-academic ones), it runs the risk of undermining its functioning in the cases where a clear consensus does exist (the academic ones). For instance, if the BOC loses the power to recommend expulsion because of the community's reaction to its treatment of non-academic cases, its power to deal with academic violations will also have been compromised. I think that would be detrimental to the Honor system.

From my perspective, five years out of school, one thing really stands out in my mind as having made my years at Caltech a net positive experience. It wasn't eating shit in classes. It certainly wasn't living in Pasadena. It was the unique sense of community that exists among the undergrads at Caltech. The Honor system plays a central part in maintaining that sense of community. Without that, Caltech would be just another school with hard classes. So, whatever you think about this current controversy, keep in mind that you have substantial potential to affect the Honor system, both positively and negatively. Please be careful.

—Mike Ravine
170-25, Geology

**God Bless You All
—Everyone**

To the Editors:

It seems to me that, lately, more and more people are voicing their dissatisfaction with different employees of CIT. From the food service to security to Warren Emery, many suggestions are made for improvement. Often however these suggestions are made to the wrong audience, or the suggestions are impractical when considering the murder laws in this state. I, however, do not want to complain in this letter. On the contrary, I want to thank several people in this community that go out of their way to help students in any way they can. These people do not get the recognition or the thanks I believe they deserve.

At the gym. Roger Garcia and Jaye Penwarden. Putting up with many obstacles in the last three years Roger and Jaye have made my 'athletic career' a hundredfold more enjoyable. Thanks.

In the administrative section. Linda King at the registrars and Sue Berkely at the MOSH's office. Both have made what often is a bad experience a little better. Waiting outside the MOSH's office is up on my list of things to avoid along with avocado. Sue makes it a little better. Often helping with matters unrelated at all. Thanks.

At the transportation office. Elsa. Not many students have a lot of contact with the transportation office. Of late I have had several occasions to need their services (official and not) and on all these occasions Elsa has been more than helpful. Thanks.

Thank you all (and many I did not mention) for making our lives here a little easier, a little nicer.

—Adam Slovik
Fleming House

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The Inside World

Blacker: I'm getting too old for this. Blacker/Fleming/Ruddock and anyone else who happened to go had a party. Various sources report an unusually large attendance of non-Caltech girls. "She followed me around hoping I would buy her drinks," said a disappointed Eric. Ed says I'm in big trouble for giving him unwanted publicity. I says to Ed, "Suck my strawberries." Brad is jealous.

Our guests this week were impressed by our curtainless dining room. They stay to chat after dinner but leave before we can treat them to an after-dinner Midori margarita. We try to fuel-inject Dave the TA, but end up drinking more than he did. We still get to class at 9:05 with coffee and Marie Lu "con huevos frescos" (no reference to Rich Arrieta). The CatWoman, after a month in dormancy, resumes activity.

Good luck, sahibs. I'm off to Malibu with my woman (the board, not Betsy).
—Aex

Dabney: Excerpt from the forthcoming novel *The Ten Percent Solution* by Brian Lemoff:

It was over half an hour before he was to make his appearance at the inaugural ball, so Kevin asked the convoy to stop at the White House on the way there. Accompanied by four security men and an Air Force officer carrying the black briefcase and volume four of *Quantum Mechanics* by Mahajan & Rubinov, Kevin walked briskly to the Oval Office where he asked to be left alone.

Up until now, wrapped in the official pomp and circumstance, Kevin had not taken the time to contemplate the unique position he now held. He was now the supreme executive, elected unanimously by well over 50% of the voting population. About to become immersed in a rare moment of introspection, Kevin's attention was snared by the sight of a tall figure occupying the chair behind his presidential desk.

"Ah, Kevin, I've been expecting you."

"Security. SECURITY!"

"Don't bother, Kevin, I've asked them to leave us alone for a while."

Then, like a petrified scallop, it hit him. "I am the President of the United States, Mr. Mittman. I will NOT submit to your domination again. I AM an independent, free thinking being" he said with perfect clarity and proper emphasis.

"Of course you are, Kevin. Now why don't you sit down and get reacquainted with some old friends." A procession of five people walked into the room and sat down in a semi-circle around Kevin. "Sit, Kevin." Slowly and inexorably, Kevin complied. . . .
—Name

Fleming: Oh what a week it's been for *fleming athletics. On Sunday the Big Red Softball machine mangled the Rudds 10-7. Brian Colder's around the back, through the legs, in the gym shorts and out single to center brought home the game winning run. The Rudds were smart, though; they got us all drunk on Saturday night (taking Burleigh off the hook), and we staggered to the softball diamond as the game was in progress. However, athleticism prevailed thanks to the strategy of swinging at the middle ball.

Bozo the the head waiter we'll get Adam (who TA's Burleigh least favorite class) up with a hot blind date (she'd have to be blind to go out with Adam). 16 will get you 20, Vitage?

Today is our last game in Interhouse Volleyball against the Scurves, if they show up. Who would blame them for not showing, since we've rolled to a 5-0 record thus far.

Okay, there's this moron Alex Wei who lives (in the closet) in Ricketts or Blacker and keeps mentioning our ex-President in the Inside Woeld of another house, possibly to start some sort of rivalry. At first I thought I'd get him back by printing the picture of him jacking off, but he openly admits to doing that five times a day. So then I decided to confront him with it and he said he was in the closet and not ready to come out yet. Alex says he's afraid to walk through Fleming because the Flemings might shave his back. Eventually, I decided to ignore him.

Ski Tahoe!!!

—Boy Wonder

Lloyd: Kind of surprising, isn't it? National Geekout Week has been a big success so far. Who knows? Some people might be headed for a life of geek-free living. There were, however, some people unclear on the concept. They buffeted me with these Top Ten Most-Asked Questions About National Geekout Week:

1. What's geekish about taped-together glasses?
2. If my watch doesn't beep every half hour, how will my friends know what time it is?
3. I don't have to play Hack. I just want to. I can stop any time I want to. It's not addictive.

continued on page 5

ENTERTAINMENT

American Ballet's "Sleeping Beauty" The Best He's Seen

by David Bruning

In its new staging by Kenneth MacMillan, the Los Angeles performances of American Ballet Theater's "Sleeping Beauty" was an absolute success. The dancing, staging, and music all combined to produce just about the finest ballet I have seen.

The two lead roles, Princess Aurora and Prince Desire, were danced by Susan Jaffee and Ross Stretton. Both were danced with the precision, emotion, and expression that are necessary to produce all of the feeling that would be spoken in a play. Victor Barbee was excellent as the evil fairy Carabosse, with outstanding pantomime explaining Sleeping Beauty's fate.

The Lilac Fairy, danced by Leslie Browne, was also superb, and successfully provided all the supernatural support that was necessary to overcome the evil fairy Carabosse. The solo dances in the wedding scene of the third act were also done very well. These included the portrayal of Puss 'n' Boots, Little Red Riding Hood and the Wolf, a gold soloist, and two bluebirds.

Throughout the evening the splendor of the staging and costumes was evident. The most spectacular scenes were those of the court balls and the hunting party, where it was very easy to see the medieval castles filled with the royalty of the time, resplendent in their finest clothes. Also created

very nicely was the forest scenes where intertwined ropes from the ceiling did provide a picture of a deep forest setting.

As always seems to be the case, the best of L.A.'s free-lance musicians were on hand to perform Tchaikovsky's score. The music very nicely complimented the dancing and also was very descriptive on its own as a story-telling device.

This really was one of the finest ballets to have been recently performed in the Los Angeles area.

CALTECH public events

GUITARIST LIONA BOYD PERFORMS IN BECKMAN AUDITORIUM

Tonight Canadian guitarist Liona Boyd will perform in Beckman Auditorium at 8 p.m. Included in her program will be selections from Satie, Fortin, Albeniz, Torres, Bustamante, Lara and Boyd.

Boyd has been awarded three of Canada's "Juno" Awards as Instrumental Artist of the Year. She is also recipient of the Vanier Award and the Order of Canada. Among the artists she has studied under are Alexandre Lagoya, Narciso Yepes, Alirio Diaz and Julian Bream.

CIT student prices to this show are \$8.75-7.50-6.25; CIT rush tickets go on sale the day of the show for \$6.00. CIT faculty and staff prices are \$15.50-13.00-10.50; TECHTIX for the same price as CIT student tickets go on sale today between noon and 4:30 p.m. at the Caltech Ticket Office.

"Belgium - Land of Two Peoples," an Armchair Adventures travel film, will screen Friday, March 27 at 8 p.m. in Beckman Auditorium. Kathleen Dusek personally narrates this documentary that explores the traditions of Belgium's two peoples, the Flemish and the Walloons.

Tickets to this film are priced at \$7.50-6.00; CIT student price is \$6.00.

Kicking off the third term is the Tibetan Opera Troupe who will appear in Beckman auditorium on Tuesday, March 31 beginning at 8 p.m. Making their first tour of the United States, this troupe will perform the folk opera "Drowa Sangmo," segments from the operas "Norsang," "Bemawobar" and "Nangsa Wobum," and the Tashi Sheba Mask Dance.

The Tibetan Opera troupe is one of the foremost interpreters of Tibetan opera in the Tibetan Autonomous Region of the People's Republic of China. They are known for their preservation of traditional Tibetan opera.

CIT student prices to this show are \$7.50-6.25-5.00; CIT rush tickets go on sale the day of the show for \$6.00. CIT faculty and staff prices are \$15.50-13.00-10.50; TECHTIX for the same price as CIT student tickets go on sale the day of the show between noon and 4:30 at the Caltech Ticket Office

On Wednesday, April 1, Dr. John Sutherland, Professor of Literature, will give a free Watson lecture entitled "Prohibited Words." Beginning at 8 p.m. in Beckman Auditorium, this lecture will explore the current debate on pornography, libel law and the state's protection of "official" secrets.

For further information about the exciting Public Events scheduled for this season, call campus extension 4652.

The Festival Song



photo by Jack Beauchamp

Glee Club members perform at the Pacific Southwest Intercollegiate Association Festival, held at Loyola-Marymount University February 28. Caltech, a founding member of the Association, has participated in this festival every year since 1929.

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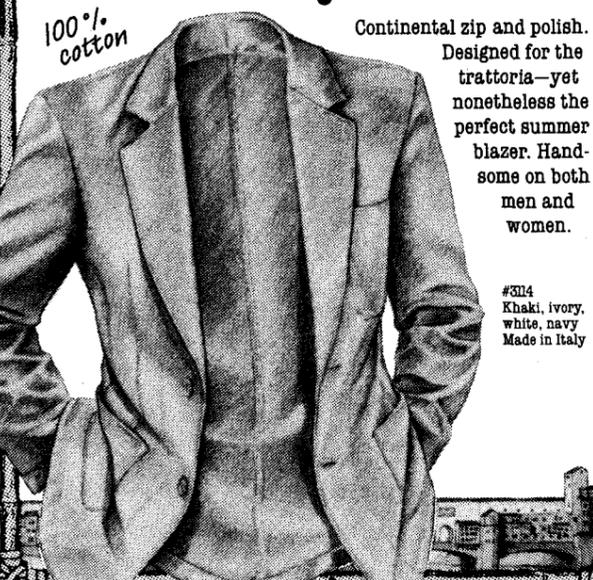
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More Inside World

from page 4

4. If I stop talking to myself during lectures, won't the professor think I'm not interested?
5. About the blue slips on my door: Isn't it so funny that someone at a demanding college like Caltech would be failing P.E.?
6. By the way, why were you running away, Haba? You can run but you can't hide from the Geek Police.
7. I think orange Caltech Alumni Fund t-shirts are fine fashion. Don't you?
8. Isn't E-mail a more personal form of communication than actually talking?
9. How many Lloydies does it take to shower one Rudd girl?
10. Well, how many 10-foot polls are there in Lloyd House?

Drink of the week is the Geek-B-Gone: espresso and Bailey's Irish Cream over ice. —Skeeter

Page: THE FINAL WORLD FAMOUS ORIGINAL MULTIPLE-CHOICE INSIDE WORLD FINAL

(To commemorate Finals Week, and to give you something to fondly remember the Page Inside World Guy by.)

- 1) Dean Wilber is taking off because:
 - a) he's not getting laid enough at Caltech.
 - b) his grades suck.
 - c) he's got a massive job offer in Santa Barbara.
 - d) he's afraid of massive retaliation after this gets published.
- 2) The Butt-fucking-Free Zone, as defined by the ABFL, consists of:
 - a) Dip and VanBladel's room.
 - b) Lower Arlington and Beast Alleys.
 - c) Beast Alley.
 - d) A little circle about an inch in diameter centered on James Ibbetsen's asshole (buttfucking free = free buttfucking. Get it? Get it?).
- 3) The things that most threaten the Page House way of life are:
 - a) Whipped Waiters.
 - b) assholes who won't show up for Announcements.
 - c) assholes who don't properly publicize house events.
 - d) Gooks with Bibles.
- 4) Cream Soda costs:
 - a) \$.30
 - b) \$.35
 - c) \$.40
 - d) nothing; MZ is an abbreviation for a Yiddish expression which means, "Here, take this."
- 5) "Fish" is to "jacket" as
 - a) "Nancy" is to "skate."
 - b) "Big Dipper" is to "Laura Hernandez."
 - c) "Clea" is to "Parky."
 - d) "Aamer Azam" is to "Miss February."
- 6) The Lower Arlington Flick/Bash/Drunken Revel will be held on:
 - a) Monday.
 - b) Tuesday.
 - c) Wednesday.
 - d) Thursday.
- 7) Page sucks because:
 - a) not enough people are on board.
 - b) not enough people come to Announcements.
 - c) everybody hides in their room and trolls instead of coming out to play volleyball like they said they would.
 - d) everybody else hates us.
- 8) Page sux but Fleming:
 - a) takes it past the tonsils.
 - b) spreads its big hairy cheeks.
 - c) sucks it back out.
 - d) All of the above, at one time or another.

—Whoops, I forgot my name

Ricketts: Note from the ["editors?"]: Our deepest, most sincere, and most heartfelt apologies go out to the members of Ricketts Hovse and to the Skillful Scribe of Scelvvy Surrealisms himself, Cookoid. Despite the fact that the proficient penman submitted his consummate composition on Wednesday night as he was told to do, we, for reasons of our own, chose not to print the masterful manuscript. It is not, therefore, the fault of the Ricketts chronicler that the Ricketts Hovse Inside World did not see print last week. We, the editors, take full responsibility for this grievous wrong and beg the forgiveness of the Caltech community and the concerned nations of the Earth. We now return you to the ever-so-popular Ricketts Hovse Inside World.

[The true editors of The Tech express our sincerest condolences to the Inside World people from Ricketts Ho[uj]se. Apparently you are engaging in some activities that deteriorate eyesight. The deadline in the masthead clearly states that all copy is due at 5:00PM Wednesday.]

Hullo.
I'm Fred.
I raise pigs.
For fun and profit.
Or at least for fun.
Welcome to this edition of the Ricketts Hovse Inside World
It carries the full approval of the Inspid City P.T.A.
It's pretty darned good, too.

It's been yet another thrilling week in Ricketts Hovse. The bridge tournament erupted in full fury Saturday afternoon. It even managed to detract from Dr. Who viewership. The happy winners of the tourney were Tom and Jim Workman (Saxy and his dad). Four Square and Beer followed the battle royale, and then we barbecued alums. Delicious. I don't think there are any prime cuts left, but there might be some ribs tucked away in the Cherry freezer. Remember, old Techers never die, they just get barbecued.

continued on page 7



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SPORTS

Tech Baseball Knocks The Covers Off

by Doug Oute

The Caltech baseball team won their first two games of the year on Saturday by defeating Pacific Coast Baptist Bible College, PCBBC for short, by scores of 4-1 and 5-4.

The first game was a beautiful example of baseball the way it is supposed to be played. After jumping out to an early lead, Caltech played very solid defense behind the outstanding pitching of Brett Bush. The offense was not spectacular but provided all that was needed. Jimbob, recalling his Tennessee upbringing, annoyed many a Baptist with his loud and colorful comments on various plays. Bruno on the other hand could just not forget the physical contact of water polo and almost went after a few players.

The second game was much

more exciting, as Caltech repeatedly tried to give away the lead, only to regain it later. PCBBC jumped out to an early lead of 1-0 which was quickly countered. In the top of the sixth, we again gave a run to PCBBC to make the score 2-2.

In the bottom of the sixth Jim Burleigh knocked the "dog crap" out of the ball with a two-out triple down the right field line. On an attempted steal of home by Jim the PCBBC catcher held Ed Zanelli's bat in front of the ball to cause him to foul it off, stopping the play. Ed returned the favor by lacing a single into right field, to score Jim.

In the top of the seventh inning we decided to give PCBBC two more runs to allow them to take a 4-3 lead. This set up the bottom of the seventh inning as one of the

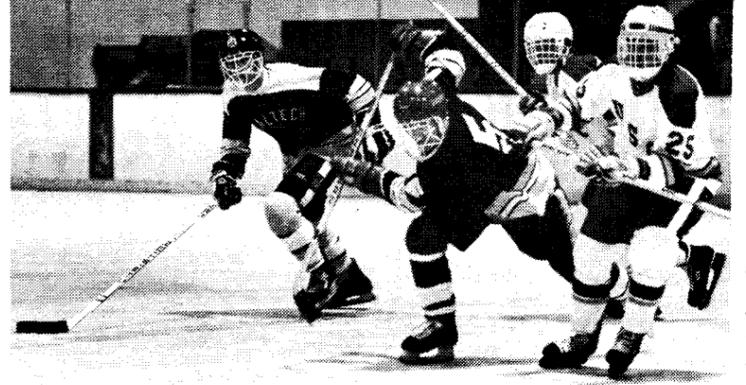
most exciting innings of Caltech baseball in recent years. Doug Roberts led off with a double down the right field line, followed by a walk to Gino Thomas.

Fearing the mighty bat of Dwight Berg, who had already slammed the baseball around the field several times, the Baptists intentionally walked him to load the bases and have a possible force at the plate. It was now up to Bruno, who grounded to first, forcing PCBBC to make the play at the plate. It turned out to be a good strategy as the catcher dropped the ball, allowing the winning run to score.

The baseball team now goes into spring training across the country. Join us when we return to face Pomona-Pitzer on the first Tuesday of next term.



The track gods raced to another victory this week, defeating their opponents soundly. The track team is currently undefeated on home ground.



Caltech's now-famous hockey team once again pulls off a spectacular win, crushing USC 9-0. In two weeks they will take on the team from MIT for a wild game between the two smartest hockey teams in the world.

Icers Get Nasty For Another Victory

by Jason

The Caltech hockey team played its last regular home game of the season Wednesday night and it was a dandy. The three things that make a great game are rowdy fans, an exciting, close game to keep them psyched, and a lopsided final score to show that the good guys can still kick butt when they want to. This game had all three.

You have to give USC credit, they don't give up. For two periods both teams battled up and down the ice and except for a single Caltech goal scored in the opening minute of the game, the game was scoreless. Peter Dowd did a great job during those two periods, keeping Tech's slim lead.

At this point most of the noise in the stands seemed to be coming from a couple of dozen drunken frat rats from USC. The rink reverberated with shouts of "Kill number 15. Kill number 15." (Gee, Dwight, what were you doing out there? Besides punching people in the head that is.)

Heavy hitting, some of it legal even, was going on everywhere. Dwight Berg knocked several people into the next time zone (not counting the punches he threw). One USC player tried to knock Marty Zimmerman over the boards which was a mistake. Marty caught the opponent in a vicious leg crunch, a move he had learned the night before while watching *Lethal Weapon*. The amazing part is that the USC player got the penalty.

Then the third period started, without USC. The third period was notable for large quantities of penalties and goals with Caltech getting the goals. The first three USC penalties of the period were nullified within 24 seconds by Caltech goals. Later the first line was removed from the ice after only 12 seconds when they scored two goals in that time period. During the third period the Caltech fans got to do all the cheering. When the final buzzer sounded the score was an incredible 9-0.

The final tally was: Jim Bower, 1 goal, 3 assists; Phil Askenazy, 1 goal, 2 assists; Mike Freeman 1 goal (Dwight was credited with another one of Mike's goals), Martin Brouillette: 1 goal, 1 assist; Jim Toth 2 assists; Pierre Harvey, 1 goal, 2 assists. Veteran Rene Fradet was back for the first time this year and he scored a goal and an assist. Dwight "Einstein" Berg got 2(?) goals including a slapshot moving at relativistic velocity that Lorentz contracted into the net past the Newtonian goalie.

Hockey action isn't over yet, folks. Next Tuesday at 11:15PM

Caltech plays USC again, this time at Burbank. Wednesday, March 25 Caltech hosts the MIT hockey team. The game's at 9:45PM in

Pasadena so if you are around spring break be sure to come to the game. The playoffs will be the first weekend of third term.

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SPORTS

Track Stars Score Again

by Trip L. Jumper

During our last meet of winter term there was some serious nail biting going on. Last Saturday, here at our very own Fox Stanton Track (New Red Version), we took on all comers. Seemed like we bit off more than we could chomp at

various times throughout the meet, but by the end of the day we had things pretty well in the bag.

Eric Smith not only won the Pole Vault, equaling his best of 12'6", but he also came back to take second in the 400 meter in-

termediate hurdles in 62.7 seconds, leaving just enough energy to blaze 200 meter in 24.9 seconds.

La Verne University dominated the sprints, however. Tom Tetzlaff ran 100 meters in 11.9 seconds and Will Evans hit the tape in 12.2 seconds. Andrew Stevens sprinted to a fifth place finish for 200 meters in 24.7 seconds. Stevens also placed second at 400 meters in 52.9 seconds.

The 3000 meter steeplechase was dominated by Caltech's dynamic duo of Ray Hu and Mike Jensen, placing best of 10:51.4 while Jensen raced to 11:03.9 on a tender ankle which he had severely sprained two weeks ago. According to O'Brien, these two are both capable of getting under 10:30 real soon.

Similarly, John Gehring displayed his distance prowess as he finished in the 1500 meters with a personal best time of 4:08.8 and then came back strong two hours later to rip off his season's best performance at 5000 meters, winning this race in 16:12.5. Additionally, Gary Bloomberg ran what many observers considered the performance of the day by coming from eighth place (last) to third, clocking a personal best of 16:58.9. If

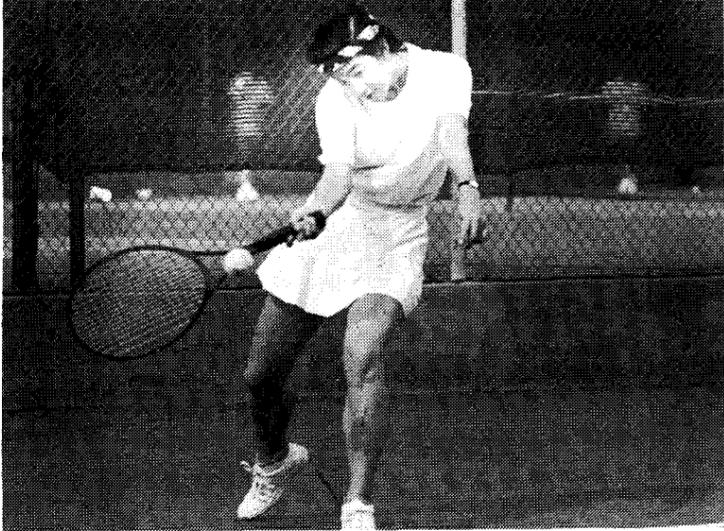


photo by Robert Paz

Women's Tennis Beats CCI 7-2. Jennifer Low takes a careful swing. She and Junko Munakata won their doubles match against CCI 6-1,6-0.

More Inside World

from page 5

In the closest contest since the lions faced the Christians at the Colosseum, the Sophomores outpiled the Frosh once again. Much blood was shed, but, fortunately, most of it was on pass/fail. Yes, Danny did, in fact, run in the wrong direction, but he was still dazed from his latest donation. Better luck next time, frosh.

Other naughty bits: What's this?!? An RLPL fulfilling the duties of his office?!? Looks like we will, in fact, have movies Friday night, thanks to Alex. I guess my comment last week that he never got to read wasn't needed. The House Couple's case of itchy 'nads was not cause for separation. A big mouth may be, though. Here's a big hello to Bruce Roberts' mom way down South. Your son parties too much. Roger, Brian wanted me to make up a story about him and some gorgeous blond California girl. I couldn't do that, though. I would hate to mislead someone's little brother. Brian is perfectly happy with a girlfriend who happens to look exactly like Niels Bohr. (Or so I'm told.) Sometimes you have to be cruel.

See y'all later—The Lil' Cook-Man

Ruddock: This is not a catshow, with prizes at the door.
—Oingo Boingo

And now, it's time to return to our regularly scheduled inside world. Welcome to Ruddock House, the happiest place on earth. Congrats to Duppy and all the frosh for the way whippin' radical beach party last Saturday night. Volleyball, dancing, Beach Boys, (and beachboys), beer, sunsets and full moons: what more could you ask? This week's social event is the taping of the Carson Show... Even Mikey likes it!

The Ruddock volleyball team is just blazing it's way to a fine finish. Stay tuned for an even more smashing interhouse basketball season, next term.

And now, in keeping with the trend: the group of the week is The Beastly Boys with their one (and only) hit-Beating Off. Members include Wayne "I wanna B-be laid" Lukens, Eric "The shirts are still on your list" van Stein, Rich "Mr. Basketball Scholarship" Till, and Joe "He's soooo Dreamy, I could Scream-y".

Despite their unfulfilling involvement in the groups activities, some members still find time to go to the weightroom 3 or 4 nights a week.

Phone message of the week: Dave—If you want it you have to come get it—Perky!?!

this race had gone another lap he would have eaten up the second place runner from Christ College.

The final scores of the meet are as follows:

- Caltech 84 La Verne 53
- Caltech 92 Chapman 47
- Caltech 93 Christ College 49
- Caltech 92 Whittier 41

Caltech 102 UCSD 19
Believe it or not, Caltech is currently boasting an undefeated record at home. That's right sports fans, 10 and 0! Your next chance to support the AWESOME ORANGE MACHINE is April 11 when we host Claremont, Redlands, and La Verne.

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WHAT GOES ON

Announcements for *What Goes On* must be submitted on an announcement form (available outside 107 Winnett) or on a plain piece of paper. Please indicate the date(s) you want the announcement to run. Send announcements to 107-51, or put them in the mail slot in the door of 107 Winnett. Announcements must be received by the Tuesday prior to publication.

Dissent in the Church

On Saturday, March 14th at 8:00 pm in the Millikan Board Room, Dr. William E. May (Catholic University of America) will address the theme "Dissent in the Church". Conference sponsored by the Newman Center at Caltech. All members of the Caltech community are welcome.

Women's Water Polo

Will there be a team this year? Contact me, Randy Brown, at 578-9562, Fleming Room 48, if you're interested. Leave a message with my personal secretary, Jim Burleigh, if I'm not in.

Attention Fishermen

Beginners fly casting lessons may be starting third term. This would be a beginners class open to all students, faculty and staff. A limited number of rods and reels will be available. Basic fly casting techniques will be stressed. Those of you interested, please contact Tom Perry on campus, x4705.

More Holes In Your Head

Ear piercing is now available (for students only) at the Health Center. This service is offered on Monday, Tuesday, Thursday and Friday evenings by appointment only. To schedule an appointment please contact Linda Pinson, L.V.N., after 5:30 pm (except Wednesday) at x6393. The cost (including earrings) is \$5.

St. Patrick's Celebration

Come celebrate St. Patrick's Day with the Master's Office, Friday, March 13 at 5:15 pm. Enjoy pipers and drummers parading down the Olive Walk, followed by music and dancing. Eat, drink, dance, be merry—be Irish!

S.P.E.C.T.R.E. Meeting

S.P.E.C.T.R.E., the Caltech science fiction society, will meet this Wednesday, 18 March 87, at 7:30 pm in the Y Lounge (upstairs Winnett). This will henceforth be our regular meeting time (every other Wednesday), moved from 7 pm to make it easier for undergrads to come—pass the word. We will have free munchies and soda, and the third episode of *The Hitchhiker's Guide to the Galaxy*. For more information call Mark Looper at 304-0006. [Society for the Prevention of Extraterrestrial Contact with Truly Repulsive Entities?]

Chess Club Starts

The Chess Club will definitely be starting up at the start of third term. We'll be meeting regularly as soon as we decide on the meeting day and time, so if you're interested, contact Huy Cao at 1-54 or call 578-9294. In either case, give your name and mail code so that the club will be able to contact you in the future.

Big Bridge Tournament

All you bridge players out there, start sharpening your skills and forming your team for the Caltech Bridge Club's Team Competition, scheduled for Sunday, April 5th. Mark your calendar now, and call Jeffrey (x4544, or 793-0814) if you have questions. If you can hold 13 cards, you can play in this tournament!

Coin Auction

A coin auction will be the activity for the March 18 meeting of the Caltech-JPL Numismatic Society. Material offered will include both foreign and old United States coins. There will be many bargains available to enthusiastic bidders seeking to enhance their collections. Officers elected to lead the club during 1987 include: President, Max Wells; Vice President, John Zimmerman; Treasurer, Henry Tanner. The club meets the third Wednesday of each month at 7:30 pm in room 168 of the Church Laboratory Building on campus. All Caltech students, faculty, and staff along with their families are most welcome to attend.

"It Again Sam" Play

Auditions for Woody Allen's *Play It Again, Sam* will be held on Saturday, March 14 and Sunday, March 15 in Baxter Rm. 25. The play is being produced by TACIT, and it will be presented during May.

Darkroom Users

The South Houses darkroom has been demolished, and most equipment was moved to the North Houses darkroom. However, the big Beseler 4" x 5" enlarger that used to be in the South darkroom has vanished. If anybody out there knows its whereabouts, please call Mark Looper at 304-0006 so we can move it North.

Undergraduate Focus Groups

Earn \$35 in cash. The Southern California Interviewing Service will be holding focus groups on Wednesday, March 18. The groups will be for undergraduates studying engineering, aerospace, computer science, electronics, aircraft, and materials science, and who are not planning to immediately attend graduate school. Come by the Career Development Center, 08 Parsons-Gates, for more details.

Student Space Group Meeting

The next meeting of the Students for the Exploration and Development of Space (SEDS) will be held on Tuesday, March 31 at 7:30 pm in Clubroom 1 of Winnett. We plan to show a film on the Apollo-Soyuz Test Project. Come see what we're about before you're overloaded with third term problem sets.

Summer \$\$\$\$

It's not too late to apply for Summer Work-Study funding. Since SAAC or FAF processing time is usually 4 to 6 weeks (unless the U.S. postal system or College Scholarship Service gremlins get you), you can still mail your SAAC or FAF for processing and have the results reach the Caltech Financial Aid Office by the May 1 deadline. You and your department (or Career Development) must arrange for your summer employment, but many departments will ask you to apply for Summer Work-Study funds. In order to accommodate you in this regard, the Financial Aid Office must have received all of your financial aid forms by May 1. This will assure sufficient time for the Financial Aid Office to determine your eligibility for this funding.

New Computer Science Course

CS12, an introduction to advanced programming techniques using efficient algorithms and data structures, will be held third term. The organizational meeting is Monday, March 30. Contact Mary Ann Maher at x6973.

Bored With Rogue?

Why not move on to something a little more challenging, like games that involve *people* instead of PCs? Stop in and join the Caltech Gamers any Friday night in Clubroom 1 of Winnett, from 7:30 pm to all hours of the morning. Even if that's not a convenient time to play, meet people and plan things for some other time. Mostly fantasy role playing games, with some other things thrown in as time permits. Anyway, it'll add some variety to your game life, and isn't just one more scroll of "fnork veeble".

U.S.G.S. Job

A clerk position with the U.S. Geological Survey. Job description will depend on the experience of the individual hired. Position will begin mid-May. You will work part-time (maximum of 20 hours) until the summer, then the job is full-time (40-hour week). Rate of pay depends on class level (minimum of \$5.18 per hour). Should be sophomore or above in geology, earth sciences, or general sciences. Come by the Career Development Center, 08 Parsons-Gates, for more information.

General Motors Scholarship

General Motors is offering scholarships for 1987-88. Students who are currently sophomores majoring in Chemical Engineering or Mechanical Engineering, have a minimum 3.2 GPA, and are U.S. citizens or permanent residents are eligible to apply. The Scholarship covers tuition, those fees directly related to course work, and an annual book allowance of \$200. Applications and further information are available in the Financial Aid Office, 12-63. Deadline is March 25.

Return Defense Polls!

If you're one of the 600 students who received a copy of the social science poll on defense issues, please take the time to fill it out and return it. We still need about 250 back, and we need to have most of them to be sure that the sample is not biased by getting responses only from the people who feel strongly about the issues (and the ones who are hungry for prizes...)

Kodak Scholarship

One Kodak scholarship will be awarded to a sophomore in Electrical Engineering. The scholarship will be made on the basis of academic and personal excellence, without regard to financial need. The amount of the annual scholarship will be 1/3 of tuition. Applications and additional information are available in the Financial Aid Office, 515 S. Wilson Ave. (12-63). Application deadline is March 27, 1987.

Political Internship

The Beckman Internship will be available for the summer of 1987. The internship, supported by friends of Dr. Arnold O. Beckman, will pay a stipend of \$2,000. It allows a selected intern to spend the summer working in the office of a politician and to see from the inside the process of government. The intern is expected to make arrangements with the appropriate political persons. It is open to any Techer who intends to be a Caltech undergraduate next year. If interested, contact Gary Lorden, Dean of Students, or Jeanne Noda, Associate Dean, x6351, or come to the Deans' office, 102 Parsons-Gates.

Bi-Phys-Chem at Yale

Want an undergraduate opportunity to participate in the research programs of the Department of Molecular Biophysics and Biochemistry at Yale? Areas of active research include protein and nucleic acid structure and function (protein-folding, protein-nucleic acid interaction, site-directed mutagenesis), mechanisms of gene expression (transcription, splicing, recombination, transposition), DNA mutagenesis and repair, regulation of development (homeotic gene control in *Drosophila*), biochemistry of intracellular protein trafficking, and membrane structure. The program lasts for 10 weeks, and pays a stipend of \$2,000. To apply, send a transcript of previous and current coursework, and a short summary of any research experience to date, and two letters of recommendation, by April 1, 1987, to: Dr. Franklin Hutchinson, Director of Summer Program, Department of Molecular Biophysics and Biochemistry, 260 Whitney Ave., New Haven, CT 06511.

Rotary Foundation \$\$\$

Talented young people with an interest in international study are invited to apply for the Rotary International Scholarship. Forms are obtainable from the Career Development Center and the deadline is March 16, 1987. There are five different types of scholarships: Graduate, Undergraduate, Vocational, Teacher of the Handicapped, and Journalism.

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