

Tech Casabamen Six Candidates Vie Today Dump Pomona For Two BOD Vacancies

BY ROGER NOLL

Caltech's varsity basketballers picked up an SCIAC league victory last Friday by dumping Pomona's Sagehens, 67-62. This was the first victory for the Beavers on the Pomona court since 1954 when Caltech won the league title. The victory gives the Beavers an even 1-1 record in league play.

Tomorrow night the Beavers face Occidental on the Oxy hardwood at 8:15. The Tigers have one of their weakest teams this year, having lost by 45 points to Redlands and two points to Claremont-Mudd. Caltech has a good chance to win this one. Occidental's attack relies on two features — consistent fast breaks led by guard Bill Oates and deadly outside shooting by forward Dave Nelson. In their own gym, the Tigers are especially ferocious, but the Beavers will probably catch them napping, and could easily pull a big upset.

Next Tuesday the Beavers host league powerhouse Whittier. The Poets have played fine, con-

sistent ball all year, and should put on an excellent exhibition on the Beaver court. But the Beavers have played their best games against the best opposition, and should make the game honorable, if not close.

In Friday's game with Pomona, the Beavers played good come-from-behind ball to nab the victory. The Sagehens trailed the Beavers for the first few minutes, then jumped into a lead that averaged around eight points which they maintained until about midway through the second half. But the Techmen caught fire during the last seven minutes, outscoring the opposition 29-13 during that period.

The Caltech heroes were many. Bill Ripka, playing with a badly sprained finger, was exceptionally outstanding, tanking 18 points, mostly in the second half, and displaying a good hustling floor game. Forward Tom Bopp was right behind with 17 points, coupled with 18 rebounds.

Tuesday the Beavers faced tall and talented Orange County State College in the Beaver Gym. The Titans were much more than the Beavers could handle as they dumped the local crew, 95-49. Hampered by injuries, the Beavers didn't play as well as in previous games, but they

(Continued on page 6)

Serigraphs Show In Dabney Lounge

The third in the current series of art exhibits at Caltech will be open to the general public in the lounge of Dabney Hall, January 16 through February 3.

The group of 37 serigraphs from the Western Serigraph Institute includes the works of such internationally known artists as Howard Bradford, Dorothy Bowen, Robert Brown and Robert Allen Smith. The exhibit has been arranged by Mrs. Jennifer Ross, exhibits director of Caltech's Humanities Division.



Flashing S.E.G.'s for the fans are the candidates in today's ASCIT elections. In the first row are would-be Representatives, Ken Leonard, Ron Counsell, and Jim Sagawa. Athletic Manager candidates (second row) are Al Bernstein, Tom Keil, and John Arndt.

Hanessian, Next AUFS Visitor Will Speak On Polar Regions

BY MATT COUCH

John Hanessian, Jr., the second member of the American Universities Field Staff to visit Tech this year, will arrive on campus next Sunday, January 22. Hanessian has spent the past six years working with and studying the polar regions.

From 1954-58 he was a member of the staff selected by the United States National Academy of Sciences to prepare and execute the United States' International Geophysical Year program. During much of this period Hanessian was Executive Officer of the Antarctic Office, and later his work was broadened to include the program in the Arctic as well. He has had the opportunity of working in both polar regions and has been a U.S. delegate at several international scientific conferences.

In 1958 he became associated with the Institute of Current World Affairs, and has just completed two years research on polar problems in England, France, Scandinavia, and in the U.S.S.R. The material gathered will be published this year and will comprise an analysis of the international legal and political aspects of Antarctica.

Mr. Hanessian grew up in Syracuse, N.Y. He has studied at Syracuse University, North Carolina State University, University of Strasbourg, Johns Hopkins School of Advanced International Studies, and Cambridge University. He holds a B.S. degree in Chemical Engineering and is being awarded a Ph.D. in international law by Cambridge. He has conducted graduate seminars at Cambridge University and at University College, London.

Hanessian's visit will last from Sunday, January 22, until Wednesday, February 1. His schedule, through Thursday, January 26, follows:

Sunday evening he will participate in the Inter-Nations Association Discussion Group.

Monday, January 23, he will speak to a Westridge School cur-

(Continued on page 8)

Strachey, British MP Talks On Deterrent

John Strachey, a Labor Party member of the British Parliament, will deliver next week's Carnegie address Wednesday, 8:15 p.m., in Culbertson Hall. The topic is "British Attitudes to the Deterrent."

Strachey has served as British Undersecretary of State in the Air Ministry and as Secretary of State for War. He is the author of over a dozen books, including "The Coming Struggle for Power," "The End of Empire," and "The Menace of Facism."

Six candidates are running in an election today to fill two vacant ASCIT Board of Directors offices — Athletic Manager and Representative at Large.

The winners will serve approximately six weeks, until the general ASCIT elections in late February. The two offices were vacated at the end of first term.

Also being scrutinized in today's vote are 21 candidates to fill the second installment of freshman class offices.

Heading the list of ASCIT candidates are John Arndt, Al Bernstein and Tom Keil, all vying for the Athletic Manager's post. Ron Counsell, Ken Leonard and Jim Sagawa are all running to be Representative at Large.

Statements of the ASCIT candidates appear on page 5 in this issue of the California Tech.

Eight candidates have filed for the two freshmen Board of Control positions. They are Jack Calma and Spicer Conant, the present incumbents; George Cady, Keith Gillen, Roy Riblet, William Schoknecht, John Slonski, and Ray Weiss.

For the other frosh offices, the candidates include Art Turner, Ed Angel and Bob McEliece, president; Tom De Klyen, George Mager, and Steve Green, vice-president; Tom Ruebel and Barry Goldberg, secretary; Duygu Demirioglu, Al Gillespie, and Frank Winkler, treasurer; and Steve Gorman and Lee Peterson, athletic manager.

MUN Picks Six Delegates

The Dominican Republic, Caltech Division, has picked the delegates to represent her at the 11th Annual Model United Nations Assembly in Eugene, Ore., next April 12.

Chief of Delegation Roger Noll announced the appointment of Jim Geddis, Bob Koh, Sid Leibovich, Lance Taylor and Tom Tisch as delegates, with Stu Linn and Tom Reubel as alternates.

The six will spend the next three months learning about the United Nations, world problems, and the Dominican Republic, and then journey to Eugene to represent Trujillo's government on the various committees and in the General Assembly.

Although the final agenda has not yet been established, such topics as Algeria, disarmament, nuclear testing, and the legitimacy of the Trujillo regime are bound to be discussed.

This year's model United Nations Conference will take a full week for travel and for the conference itself.

Wiesner Outlines Arms Problems

Dr. Jerome Wiesner, newly appointed Special Assistant to the President for Arms Control, gave an encouraging example of how our new leaders think about and approach the problems that confront them.

Wiesner, officially tongue-tied by his new appointment, had to scrap his prepared speech, instead talked off the cuff about maintaining maximum security for the nation, establishing an arms control program, and eliminating what he referred to as "noise" in a defense system.

He thinks that large steps must be taken in the direction of disarmament, steps which involve correspondingly large risks in terms of their effect on the balance of power, because time is running out. It is becoming increasingly difficult to keep pace with weapons development; as a result, we always find ourselves dealing with obsolete problems.

Wiesner pointed out the problem of political and military paralysis — we overestimate the capability of our enemies, and

underestimate the capability of ourselves. He cited the example of overestimating the size of the Russian air force, and as a result building an air defense system that we hoped could contain an attack from such a force. Turns out the Russians had a considerably smaller force, and as a result, our defense system, previously thought somewhat inadequate, suddenly was perfectly adequate. This causes waste, efficiency and mistrust.

He concluded by observing that nuclear weapons will become much more common place in the next decade. These weapons act somewhat as equalizers, in that a small country with nuclear capability can make itself heard.

Before we reach this stage, it is imperative that arms controls be set up and provisions be made for a World Security System.

Shearing Slated For Jazz Show

George Shearing, the Hi-Lo's and others will be featured at Caltech's Third Annual Jazz Concert, to be held Friday, February 10, in the Pasadena Civic Auditorium.

Tickets for the concert will cost \$3.75 and \$2.00 to the general public, with 50 cents discount for Caltech students. Tick-

ets will go on sale next week at the News Bureau, mutual agencies, and House representatives.

Dick Norman, ASCIT Activities Chairman, is in need of help in running the concert. Anyone wishing to donate some of his time and effort leave a note in the "N" box in Blacker.

Editorial

ASCIT Incompetence, II

With ASCIT election season almost upon us again we feel it time to start a campaign to get more responsible people elected to student body offices or at least to give voters a more intelligent basis for choice.

The present BOD was elected with some very gung-ho, yet very nebulous, ambitions. For example, here are some of their campaign statements from the California Tech a year ago:

**BILL BAUER
PRESIDENT**

Many criticisms of ASCIT have been offered during the past year; but not matter what the particular complaint, one remedy has been persistently advanced for all discomforts: "Let's change the system."

This was the case with ExComm; the elimination of the committee was proposed before even a summary analysis.

It happened to the Big T, which was recommended to the chopping block because of high costs, before anyone had any firm idea of how to economize within existing structure. In my opinion, this approach is fundamentally wrong. What ASCIT needs is a clarification of present procedures.

We need a stronger ExComm, one which can deal with future questions similar to the loyalty oath.

We need a more efficiently planned Big T with a revised salary distribution and other improvements.

It has been charged that the BOD has assumed too much responsibility. I say that it has assumed too little. The Board should not—and has not—concerned itself with minor details of operation. But it should and here it has failed, to insure that its general objectives are achieved at all times. It has delegated responsibility, then lost interest in the project.

This is the basic problem of ASCIT. Herein lies our chance to improve.

**CLYDE ZAIDENS
VICE-PRESIDENT**

The major consideration of the Veep is our Honor System, of which the BOC is the guardian. There is much that can be done to clear up misunderstandings, introduce the philosophy of the system to ourselves and to the outside world, and examine the "fringe" areas where most of the problems occur.

The developing ExComm is the place where we should look for true leadership in government. My experience on this body, along with a position of IHC and chairman of the House UCC's, has given me the background to carry out the duties of Veep with originality and inspiration.

Is it obvious to the student body that their officers have done for them what they promised either in spirit or in fact? It is not obvious to us.

More similar meaningless words appear on page 5 as promises from candidates for the two BOD vacancies. We are not optimistic.

This year as one possible step in ascertaining for all what the ASCIT candidates really intend to do and really are capable of doing the California Tech proposes printing candidate answers to specific questions rather than 100 words of general gung-ho-ness.

We would like to invite everyone to submit to us questions they would like to see the candidates answer. If this stirs up some good ideas we will try to print answers to those that seem most revealing. Also, of course, we welcome suggestions of any other project the California Tech might consider to make this a better election.

**TIM LITTLE
SOCIAL CHAIRMAN**

The principal difficulty with the ASCIT social program lies in the lack of interest and participation rather than in the events themselves. Last year, for example, less than 65 couples took advantage of the \$1500 winter formal. I think that this number would have been greater had there been more publicity to bring about a tendency for people to plan for ASCIT events rather than simply acknowledging their existence.

With the majority of the student body living on campus next fall, a concentrated publicity campaign, plus more House emphasis on campus social events, can bring about renewed interest. That will be my goal.

**DAVE PRITCHARD
SECRETARY**

The chief functions of the ASCIT Secretary are to report the actions of the BOD to the students and to fulfill his voting position on the BOD.

In order to do the former effectively, I favor two approaches. One is the continued wide distribution of ASCIT minutes. The other approach is to make more use of the secretary's column in the Tech and more interesting meal-time announcements. This will create student interest in things before they are done — leading the way for more student participation.

As a member of the BOD, I will exert what influence I can toward keeping ASCIT relatively informal and truly representative of the student body.

**JOHN GOLDEN
BUSINESS MANAGER**

The responsibilities of ASCIT Business Manager are two-fold: business management and BOD membership. Efficient and dependable management of publication, offices, and corporation property is essential. Also important is keeping the News Bureau aware of ASCIT activities. As a Board member, the business manager reflects student opinion as much as possible, but he should use imagination in voicing opinion and in voting to shape ASCIT policy.

I believe the BOD should concern itself with general student welfare — as well as routine duties — through appropriate channels such as ExComm and EPC.

Tensions Rise In Power Duel;
Donnelly Charges BOD 'CS'

The Waterfight Chairman announced yesterday that the new rules for the annual IHC-BOD waterfight have been completed and will be available in time for the IHC-BOD spring waterfight to be held this Saturday at 11:30 a.m. on the Athenaeum lawn.

Due to the fact that IHC membership was changed, the rules have been changed to legalize a six-man team, plus one

alternate; the presidents of both the IHC and the BOD must be active team members and not alternates.

Anything (including fire hoses) containing water in liquid form can be used as ammunition. The fight is 30 minutes long or until one side is completely drenched, while any team member hitting a viewer or judge becomes an alternate

and his team then has only five members. Alternates may not fire back if hit with ammunition.

However, Bill Bauer, ASCIT president, announced Monday that the Board of Directors feels that the waterfight concerns the NEXT BOD and that the date should be postponed until the new Board takes office. The official statement of the IHC, as

(Continued on page 8)

THE
TELEPHONE
IS ONLY THE
BEGINNING!

The Bell Telephone System involves more than the telephone. Communications is now a wide field. Illustrating this fact is the opportunity offered by members of the Bell System Team.

Senior or Graduate Students will want to talk to our employment representative when he visits...

CALTECH

WEDNESDAY and THURSDAY

FEBRUARY 8 and 9



Pacific Telephone...

has openings for technical graduates for engineering and administrative positions in the Los Angeles Area. Each accepted applicant enters a management training program. This is rotational through various departments for about two years. Successful completion can lead to advancement on a merit basis to middle management positions and above.



offers opportunity to men in engineering and administrative positions throughout the United States with technical and non-technical backgrounds in several different fields:

In Plant Layout; design of test sets, tools and equipment; quality control and other engineering. • Research and development of data processing equipment. • Field engineering in defense communications systems. •



BELL TELEPHONE
LABORATORIES...

offers opportunity in one of the world's foremost research laboratories. Opportunity in three kinds of scientific and engineering work is available.

1. Research and development
2. Systems Engineering
3. Specific development

Also offered, is a communications development training program that provides graduate level training with credit.



SANDIA
CORPORATION...

offers opportunity in applied research, development and design of the ordnance aspects of the complete atomic weapon in Livermore, California. Electronic and physical science majors can fully utilize and develop their talents in this challenging and kinetic field of meeting the strategic and tactical needs of the military.

New Idea Advanced Work Interviews Scheduled On How Fish Swim

Want to know why fish have an edge in swimming ability over people-type submariners? Try this for size.

For centuries it was conjectured that fishes swam by flipping their tails and using their fins as paddles. People accepted this vague description of the motion as a possible explanation for the principle of swimming, apparently unaware that fish with tail and fins removed swim almost as well as normal fish.

Recently, several biologists found themselves much perplexed by findings obtained in various investigations of fish swimming. They noted in general that swimming speeds attained by fish and mammals were incredibly high in relation to their available muscle power.

In fact, in studies of salmon swimming up the Columbia River and the rapids and cascades to spawn, it was found that not nearly enough energy could be produced by the food taken in and the amount of fat lost en route to account for the energy required for the journey.

This discovery brought forth some questions: How efficient is the propulsive system of fish? Can oscillating propulsion com-

pete with the propeller? Is oscillating motion or soft skin inherent in low frictional drag? Perhaps these questions might lead to new understanding that could point the way to the designing of faster ships and other vehicles.

Seeking answers to these questions, some scientists invited small fish into their laboratories. Others selected fish or sea mammals as large as porpoises. Dr. T. Yao-tsu Wu, associate professor of applied mechanics at Caltech, went at the problem by studying the hydrodynamics of swimming bodies. He got some theoretical results he believed to be relevant to the answer.

Like other theories, this one needed testing. Parallel to this study, an experimental program was undertaken by Howard R. Kelly, aeronautical engineer at the Naval Ordnance Test Station, China Lake, Calif.

For this purpose, Glenn Bowlus, engineer at the Pasadena office of NOTS, designed and built a machine that can simulate the wave motion produced by any fish. The experiments with the device were carried out by Kelly and his colleagues

(Continued on page 4)

January 20:

Lockheed Aircraft Corp (Missile Division)—BS, MS, PhD/Ae, ME, EE, Ma, Ph, Ch.

Anaconda Wire & Cable Co.—BS/EE, ME, ChE.

Jet Propulsion Laboratory — BS, MS, PhD/Ae, EE, ME, Ch, Ph, CE.

January 23:

Borg-Warner Controls — BS, MS/EE, Ph.

John Fluke Mfg. Co., Inc. — BS/Engineering; Summer — Jr./Engineering.

General Foods Corp.—BS/ChE, ME.

Stauffer Chemical Co. — BS, MS, PhD/Ch, ChE, ME, EE.

January 24:

Applied Research Labs., Inc.—BS/EE, ME, Ph.

Borg-Warner Controls — BS, MS/EE, Ph.

Chance Vought Aircraft, Inc.—BS, MS, PhD/Ma, ME, Ae, EE, CE, Ph.

Minneapolis-Honeywell — BS, MS, PhD/EE, ME, Ph; MS, PhD/Ch, Ma.

Standard Oil Co. of California —BS, MS, PhD/Ch, ChE, Ma; BS, MS/ME, CE; PhD/Ph.

January 25:

American Machine & Foundry Co.—BS, MS, PhD/EE, ME, ChE,

Ch, Ph.

Carnation Co.—BS/ME, EE.

Minneapolis-Honeywell* — BS, MS, PhD/EE, ME, Ph; MS, PhD/Ch, Ma.

J. O. Ross Engineering—BS/ME, ChE.

Standard Oil Co. of Cal.*—BS, MS, PhD/Ch, ChE, Ma; BS, MS/ME, CE; PhD/Ph.

January 26:

Beckman Instruments, Inc.*—

BS, MS, PhD/EE, Ph.

Space Technology Labs., Inc.* —MS, PhD/EE, Ae, ME Ph, Ma.

Westinghouse Electric Corp.—BS, MS/EE, ME, Ph; Summer—Jr.

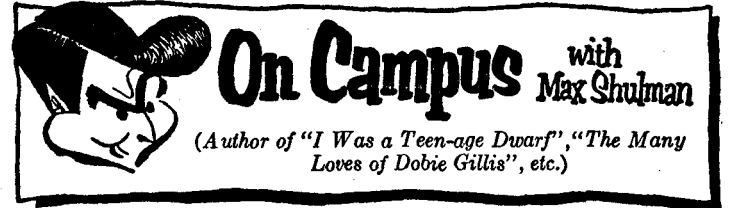
Don Baxter, Inc.—BS, MS/ME, ChE; BS, MS, PhD/Ch.

January 27:

Space Technology Labs., Inc.* —MS, PhD/EE, Ae, ME, Ph, Ma.

Union Oil Co. of Cal.*—BS, MS, PhD/ChE; Ph/D Ch; BS/EE.

(Continued on page 8)



HOW SMALL CAN YOU GET?

Today let us address ourselves to a question that has long rocked and roiled the academic world: Is a student better off at a small college than at a large college?

To answer this question it is necessary first to define terms. What, exactly, do we mean by a *small* college? Well sir, some say that in order to be called truly small, a college should have an enrollment of not more than four students.

I certainly have no quarrel with this statement; a four-student college must unquestionably be called small. Indeed, one could even call it *intime* if one knew what *intime* meant. But I submit there is such a thing as being too small. Take, for instance, a recent unfortunate occurrence at Crimscott A and M.

Crimscott A and M, situated in a pleasant valley nestled between Denver and Baltimore, was founded by A. and M. Crimscott, two brothers who left Ireland in 1706 to escape the potato famine of 1841. As a result of their foresight, the Crimscott brothers never went without potatoes for one single day of their lives—and mighty grateful they were! One night, full of gratitude after a hearty meal of French fries, cottage fries, hash browns, and au gratin, they decided to show their appreciation to this bountiful land of potatoes by endowing a college. They stipulated that enrollment should never exceed four students because they felt that only by keeping the college this small



could each student be assured of the personalized attention, the camaraderie, the feeling of *belonging*, that is all too often lacking in higher education.

Well sir, things went along swimmingly until one Saturday a few years ago. On this day Crimscott had a football game scheduled against Minnesota, its traditional rival. Football was, of course, something of a problem at Crimscott, what with only four students enrolled in the entire college. It was easy enough to muster a backfield, but finding a good line—or even a bad line—baffled the most resourceful coaching minds in the country.

Well sir, on the morning of the big game against Minnesota, its traditional rival, a capricious destiny dealt Crimscott a cruel blow—in fact, four cruel blows. Sigafos, the quarterback, woke up that morning with the backbone fever. Wrichards, the slotback, was unable to start his motorcycle. Beerbohm-Tree, the wingback-tailback, got his necktie caught in his espresso machine. Langerhans, the fullback, was stolen by gypsies.

Consequently, alas, none of the Crimscott team showed up at the game, and Minnesota, its traditional rival, was able to score almost at will. Crimscott was so out of sorts that they immediately broke off football relations with Minnesota, its traditional rival. This later became known as the Dred Scott Decision.

So you can see how only four students might be too small an enrollment. The number I personally favor is twenty. How come? Because when you have twenty students and one of them opens a pack of Marlboro Cigarettes, there are enough to go around for everybody, and no one has to be deprived of Marlboro's fine, mild flavor, of Marlboro's easy-drawing filter, of Marlboro's joy and zest and steadfast companionship, and as a result you have a student body that is filled with sweet content and amity and harmony and concord and togetherness and soft pack and flip-top box.

That's how come.

© 1961 Max Shulman

You will also find twenty cigarettes—twenty incomparable unfiltered king-size cigarettes—in each pack of Marlboro's new partner in pleasure—the Philip Morris Commander. Welcome aboard!

New opportunities for engineers.

NEW NAME: CHANCE VOUGHT CORPORATION

The name used to be Chance Vought Aircraft, and it fit the company perfectly. No other name is more closely associated with aviation's growing years and great hours. But today, Chance Vought has expanded beyond its traditional field into other market areas, both military and industrial. The Aeronautics Division, which supplies the new all-weather Crusader to the Navy and is at work on other aircraft and missile projects, is also headquarters for a company-wide anti-submarine effort • The Astronautics Division — deep into studies for manned space flight — is prime vehicle contractor for the NASA Scout and a key contractor on the Air Force Blue Scout Junior, both research rockets • An aggressive Electronics Division supplies components and systems to major U. S. defense and research programs • Vought Range Systems is a world-wide service organization with space-tracking, range instrumentation and many other responsibilities • Vought Research Center feeds basic knowledge to all divisions • A subsidiary — Vought Industries, Inc. — is the nation's leading producer of mobile homes • Another subsidiary — Information Systems, Inc. — produces industrial automation and process control equipment • National Data Processing Corporation, in which Chance Vought owns a majority interest, specializes in business data processing equipment, particularly in the banking field. If new products, new objectives figure in your career plans, investigate the wider range of opportunity and greater security offered by Chance Vought Corporation. Please address inquiries to: Professional Placement Office, Chance Vought Corporation, Dallas, Texas.



CHANCE VOUGHT

Aeronautics • Astronautics • Electronics • Range Systems • Research
Mobile Homes • Industrial Automation • Business Data Processing

OUR REPRESENTATIVE WILL BE
IN YOUR PLACEMENT OFFICE
JANUARY 24

Poetry Of Former Farmer, J. M., Fish Swim On; Science Shows Powerful Construction Trails In Watery Wake

BY ROGER NOLL

During the Christmas holidays, while rummaging through my late aunt's legacy of family heirlooms, I chanced upon an antique book of poems by a minor Victorian poet, James McLaughlin Crill. The poems seemed very interesting, so I began a small bit of research into the life and writings of Mr. Crill.

Crill was born August 23, 1853, in Steffan-on-Terrie, a small section of Worfsford, near Bringwell. His father was a very poor hog farmer, and his mother died when Crill was only three. Crill spent his early years tending pigs, but when he reached the age of 14 he left home, aspiring to become a society reporter for the Times. After several frustrating months with little food, he landed a job as usher at the Wurland Theater in London, which proved to be the catalyst to his entering the literary world.

It was at the Wurland he met the famous actress, Vivienne Le-Rus de Fruster. Although she was 11 years his senior, she fell in love with him and financed his entry into the poetic circles. Using her money, he published eight books of poetry (more than Keats, Browning or Whitman), none of which was ever successful.

SEVERELY PANNED

Crill was always severely panned by critics, who charged him with everything from "plagiarism without enough talent" to "uninspired Thesaurus-usage." But mid-Victorian critics were harsh on many men, such as Gluyen and Fruhn, so we should not take their criticism for more than face value.

Crill believed his best poem to be "Fledgling," published below.

Crill said of this poem, in the introduction and author's preface to his book, "Parcels in the Dust," that:

"I wrote this poem while contemplating my piqued indignation at the turn of things in Commons. I could never bear Dizzy's long harangues, and this day his prattlings never ceased. The poem itself reflects not but the frustration of life's unbearable contortion, yet hints the proper understanding of man by man and woman, and takes cognizance of the worth of scientific thought. I am proud of it, and of its philosophy so cogently described."

The poem, while admittedly pointed, is probably not that good. Here it is, and it is strongly suggested that the reader peruse each line with care — the poem's full force is missed if it is read in less than two minutes.

FLEDGLING

By James McLaughlin Crill
Ah! the world! so young, so
frought with mystery, unknown!

What fogginess of mind prevents
Our soul from Reaching out beyond

For yet but grasp the misty
morn of thought.

There you stand, you human
form

Of weakness and dismay,
You wretched animal of Fat's
cruel and heartless stroke!
But created yet for naught but
to not know.

Flow On, O river of remorse,
And drown the hopes of learning
more

For all is known that man is
yet for to know.

The immediate impression from reading this poem is that Crill had a deep appreciation of conjunctions. In line four, for instance, he writes, "For yet but" rather than the simpler form, "to." In line eight, and the last line, his use of the conjunction creates quite a problem in interpretation — one thinks heavily on the meaning of "yet for naught but" only to become more confused. In "yet for to know" the meaning is deeper, but more obscure. The connotation thus implied, that man's destiny has so far been "to not know," but that (through the use of the word "yet") this destiny is subject to change in the future, is certainly a concept original in English poetry, and worth pondering.

POWERFUL CONJUNCTIONS

The construction of the poem is like the use of conjunctions, strange but powerful. Many critics

have contended that in the original version there was probably another line between lines three and four, but somehow (probably in the process of printing) it was left out. On the other hand, if one investigates the poem more thoroughly, it becomes clear that the fourth line is but an example of poetical onomatopoeia. In reading the first part of line four, one actually experiences the "misty morn of thought."

Several members of the "Lost Line" school referred to above also claim that the second-from-last and third-from-last lines have been inserted in this poem, actually belonging in some other work in the book — again, the printer is blamed. But if one fully understands the poet, it is clear that these lines, too, serve an important purpose, for, as in Keats' "Ode to a Nightingale," they serve to bring the reader back from the never-never land of frustration and misty

(Continued on page 8)

(Continued from page 3)
in a water tunnel at the Caltech hydro lab.

The motion of the mechanical fish was produced in a pliable foil of copper (or of other flexible material) about four inches wide and 12 inches long by seven crank rods working off gears on a drive shaft.

Fish swimming was simulated by varying the frequency of the undulations of the foil which was immersed in a water stream of different velocities in a water tunnel. To make the resulting flow visible, a purple dye was released at the front edge of the foil, transported by the flow along the foil surface, and mixed with the resulting eddies in the wake.

A major portion of Dr. Wu's theory was tested in this experiment. It was found that the theory is in good agreement with the experimental result. Having established the soundness of the theory, the Caltech engineer is applying it to calculate the most

efficient form of the motion under various swimming conditions. His work is supported by the Office of Naval Research.

Here is the emerging concept of how a fish swims:

The fins do not produce propulsion. They serve to control and stabilize the side and vertical motion, much as ailerons serve the same purpose in airplanes.

The main propulsion comes from the fish body. The wiggling motion produces a pressure difference across the two sides of the fish. Forward thrust is achieved if the body is angled so that the side of greater pressure pushes the fish forward. This thrust necessarily must overcome the viscous drag from the water flow over the body surface if the fish is to maintain its swimming speed in water.

(Continued on page 5)

562 PROGRAMS, PROJECTS & STUDIES AT HUGHES

THE DIVERSITY OF ELECTRONICS

ACTIVITY AT HUGHES PROVIDES AN IDEAL ENVIRONMENT FOR THE GRADUATING ENGINEER OR PHYSICIST. THESE ACTIVITIES INCLUDE:

- Polaris Guidance Development
- Army/Navy Computer Systems
- Space Ferry
- Fixed Array Antennas
- Fire Control Radar Systems
- Pulsed Doppler Radar and Anti-Submarine Warfare
- Naval Tactical Display Systems
- 3-Dimensional Radar
- Air-to-Air Missiles
- Space Propulsion Systems
- Tunnel Diodes
- Infrared Devices
- Satellite Active Repeater Development
- Wide Band Scanning Antenna Feed Systems
- Microwave Antennas and Radomes
- Guidance and Navigation Computers
- Satellite Communication Systems
- Satellite Reconnaissance Drone
- World-Wide Communications Networks

- Command Control and Information Processing
- Micro-Electronics
- Linear Accelerators
- Gamma Rays
- Nuclear Fission
- Remote Handling Devices
- Photoconductive Materials
- Electroluminescence
- Solid State Display Devices
- Terminal Communications
- Line-of-Sight UHF and VHF Relay Systems
- Air Traffic Regulation and Landing System
- Pincushion Radar
- Logi-Scale General Purpose Computer
- Radar Closed Loop Tester
- Missile-Range Ship Instrumentation
- Precision Trajectory Measurement System
- Space Vehicle Subsystems
- Telemetry Systems
- Radiation Sources, Detection, Handling Equipment and Effects Analysis
- Inertial Missile Guidance Systems
- Machine Tool Controls
- Microwave Tubes
- Transistors and Diodes
- Rectifiers
- Thermal and Magnetic Relays
- Crystal Filters
- Digital Components and Devices
- Plasma Physics Research

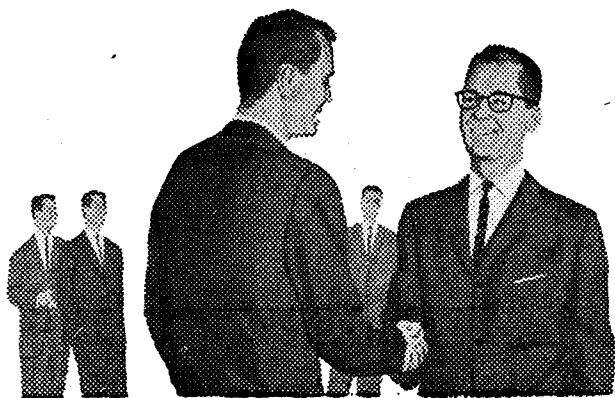
ELECTRICAL ENGINEERS AND PHYSICISTS
B.S., M.S. and Ph.D. (June and Summer Graduates)

Members of our staff will conduct
CAMPUS INTERVIEWS

February 2 and 3, 1961

Find out more about the wide range of programs, unique Professional Register, advanced educational programs and relocation allowances offered by Hughes.

For interview appointment or informational literature consult your College Placement Director. Or write Hughes College Placement Office, P.O. Box 90515, Los Angeles 45, California.



CREATING A NEW WORLD WITH ELECTRONICS

HUGHES

HUGHES AIRCRAFT COMPANY
Culver City, El Segundo, Fullerton,
Malibu, Newport Beach, Oceanside,
Los Angeles, Calif.; Tucson, Arizona

Candidates State Their Objectives

If upperclassmen remember the election speeches of last year's BOD candidates, they will remember many pledges to "bring the BOD to the students."

I believe that the time has come for the students to go to the BOD if they want something done. For example, I would like to see what can be done about parking tickets received by students who have been forced, because of lack of space, to park in areas not designated for student parking, and I feel that the BOD is a good place to start looking.

Many Techmen are loud-voiced in their criticisms of the Institute. I am most concerned with its good points, and I will do my best to eliminate any complaints I hear.

Routine qualifications: I feel that I am qualified to care for the bulletin board and run the errands of the BOD. If elected, I will take my seat at BOD meetings with the motto, "Beware David Kubrin."

Ronald Counsell

I could be running for Representative at Large because I don't have enough work to do now, or I could be running because my girl friend would be proud of me if I won. I might even be running in order to right a tremendous wrong (ASCIT). I could be running for all of these reasons, but I'm not. Mostly, I'm just running because it would please me greatly to bask in the power and glory connected with the office. (Why else did we come to Caltech?) I ask your vote in my quest for these, above all things, the dearest to me; besides, my girl friend would be proud of me.

Ken Leonard

One of the things that brought notoriety to past Representatives at Large was the state of the Olive Walk bulletin board. Campaign promise: I shall keep it up-to-date and informative. The Charities Drive has already been held, but the Representative at Large also conducts the Red Cross Blood Drive. Campaign promise: I shall do my utmost to cause the greatest degree of blood-letting. Platform: I stand on the above, plus my interest in representative ASCIT activities. Like others, I have not always understood BOD actions and I would like to act as representative to the august body and to become more familiar with BOD procedures. Qualifications: I'm a sophomore.

Jim Sagawa

With only about seven weeks left in the current ASCIT administration, many of the students may be led to believe that this election for Athletic Manager is unimportant. This is not the truth. I believe that the Athletic Manager to be elected still has many things to do in these seven weeks. Besides being on the BOD there continues to be the problem of straightening out the athletic awards, jackets, etc., with Whiting Co. and also thrashing out the problem of what Caltech should do about football. There has been some talk going on that we should drop football, and if not, who we should schedule for our games. Needless to say, if I'm elected, I will do my utmost to support football and will find out

just what is the stand of the faculty on not only football but the whole general sports picture is.

John Arndt

During the past 39 years, Caltech athletic teams have been uniformly rotten. During this period, the ASCIT Athletic Managers have been of one uniform type, i.e., the "athletic type." It is quite probable that there exists some correlation between these two situations. I suggest, therefore, that the student body try electing a different type of Athletic Manager, i.e., the "un-athletic type." I feel that I am of this type, as I have never been a member of any school team and at the present time do not even take P.E. (medical excuse). I, therefore, suggest that the student body try out a fresh approach for the next eight weeks and elect me as Athletic Manager.

Allen Bernstein

Fish!

(Continued from page 4)

Of course, the fish must use energy in keeping up the undulating motion of its body. A part of this energy goes in to the useful work (which is equal to the thrust multiplied by the swim speed); the remaining part of this energy is spent in energizing the flow and creating vortices in the water, the latter part inevitably being wasted. The ratio of useful work to the total energy put in by the fish gives the efficiency of swimming.

The theory indicates that in order to put out enough thrust to overcome the drag and to do this efficiently, the body motion of the fish should be of a wave form which propagates from the front to the tail with the wave speed faster than the speed of swim. The amplitude of the wave should grow larger as it travels down the body.

In other words, Dr. Wu ex-

(Continued on Page 7)

Egod!

Glee Club Slates Many Concerts

Under the leadership of Olaf Frodsham, director, the Caltech Glee Club has begun its second term series of concerts. The first official concert of this year was held last Monday night, January 16, for the Caltech Service League. The Glee Club sang six songs, including a selection by Brahms and the Caltech Alma Mater.

Other concerts for this term include a Polytechnic High

School Assembly today before lunch, the Pasadena Women's Symphonic Association next Wednesday, and the Institute of Dairgaba Concert a week from Saturday.

Glee Club members are also scheduled to go on a tour from March 19-25, during the spring recess. The tour will probably be in the San Francisco area.

California Tech

Published weekly during the school year by the Associated Students of the California Institute of Technology, Incorporated.

Editors

Tom Tisch, John Todoroff

Managing Editors

Lance Taylor and Roger Noll

Editorial Staff

Craig Bolon, Dan Entingh, Larry Gershwin, Bob Greenwald, David Helfman, Richard Karp, Chuck Leonard, Butch Lungershausen, Bill Meisel, Barry Petersen

Business Staff

Cleve Moler, Manager

Circulation Manager: Howard Monell

The California Tech, 1201 East California Blvd., Pasadena, California.

Member of The Associated Collegiate Press

Second Class postage paid at Pasadena, California

Printed by Bickley Printing Co.

Represented nationally by National Advertising Service, Inc.

Subscriptions: \$1.00 per term, \$3.00 per year. Write: Circulation Manager.



**"GIVE A MAN A TOUGH JOB AND A CHANCE TO GO SOMEWHERE
...AND HE'LL BREAK HIS NECK TO DO IT"**

In 1958 when Bill Ebben was only a few months away from his engineering degree at the University of Detroit, he was in touch with 15 prospective employers.

He chose the Michigan Bell Telephone Company because: "This company offered the kind of engineering management opportunity I wanted—and they weren't kidding."

One of Bill's first assignments was a survey of Michigan Bell's big Central District to find out how long available building space could accommodate the switching equipment required by rapid telephone growth. "I wasn't given any instruction," Bill says, "I was just told to do the job."

So Bill did it. His report became the guide for planning and budgeting future construction.

On his next move, Bill proved he could handle supervisory responsibility. He was sent to head up

a group of seven engineers to design a new long distance switching center for Saginaw, Michigan—a \$4,000,000 engineering project.

Today, Bill is on the staff of Michigan Bell's Program Engineer. He's working on a system for mechanized control of telephone construction costs.

How does Bill feel about his job? "Give a man a tough job and a chance to go somewhere—and he'll break his neck to do it. Of course, I don't think I'm going to be running the business next year—but I'm getting every opportunity to hit the top. You don't worry about opportunity here—you worry about whether you're as big as the job."

If you're a man like Bill Ebben, a man who can size up a job, figure out what needs to be done, and then do it—then you should get in touch with one of the Bell Companies. Visit your Placement Office for literature and additional information.



"Our number one aim is to have in all management jobs the most vital, intelligent, positive and imaginative men we can possibly find."

**FREDERICK R. KAPPEL, President
American Telephone & Telegraph Co.**



BELL TELEPHONE COMPANIES

SPORTS

Tibbetts, Chesebro, Buck Spark '61 Swim Team

BY TOM TISCH

If you've been out to the Gym recently and heard the surly voice of a pseudo-drill instructor coming from the pool area, then you know that swimming practice has started again in preparation for the first meet on February 18 at UCLA.

Last year's SCIAAC champs are hoping to repeat in that role and the early workouts give them a good start in that direction. Indications so far are that the team will be fairly well balanced and should again win the conference title.

Heading the list of returning swimmers — only two were lost by graduation last year — is Senior Gary Tibbetts. Last year Tibbetts took second in both the 220 and 440-yard freestyle events in the Conference meet, as well as swimming a top-notch leg on the 400-yard freestyle relay team.

This year things will be rougher in that bracket as Oxy and Redlands both have excellent returning medium distance men.

Marshall Buck is expected to repeat as conference champ in the 200-yard breaststroke, while Bill Hogan and possibly Al Huber will be able to give him some exciting competition.

In the backstroke, Gary Turner is returning, and with a little luck could take the conference in that event. Last year he was second to Rick Morse of CMC, who has since graduated. In the butterfly, Bill Howard, Marshall Buck, Gary Turner, and possibly Peter Mayer will probably take all the marbles.

Bright spot in this year's freestyle event is Sophomore Bruce Chesebro, who last year set new freshman records in the 50-yard

and 100-yard sprints. Also up from last year's frosh team is Larry Daubek, adding much to the above events as well as staking out a place in the 220-yard and 440-yard events. Gary Mitchell, too, will round out the complement of freestylers.

With the exception of the diving events then, Caltech's team will be as strong as it has been in past years. The league schedule will be a little tougher this year, though, since the other teams in the league have generally gained strength.

The first meet is a double-dual with UCLA and Los Angeles State at UCLA on February 18. Last year the Beavers lost to UCLA by the point margin caused from losing the 400-yard medley relay by six inches.

Tyler Lectures Diners On Liberian Problems

By STEVE LUNER

In almost any newspaper you see in the United States today you will find on the front page some mention of the Liberian crisis. However, who can believe what he reads in the newspapers. On the other hand, the word of a YMCA World Service secretary may be accepted as infallible, albeit a little stale. For instance, you might learn that there is no crisis in Liberia.

This and much more was the patient suffrance of the members of Y Diner's Club as they were beleaguered by the platitudinous ramblings of Dan Tyler, who spoke on his 1959 trip into Liberia.

For instance, in the special section of the Thanksgiving San Francisco Chronicle on Africa it was told that the descendants of the freed American slaves who settled in Liberia formed a political and economic elite. This is a plie of balderdash, emphasizes the traveled Mr. Tyler. Since the forties the expression "Americo-Liberian" has become

taboo.

Mr. Tyler remarks that the population explosion in Africa has not yet died up to a fizzle, underpopulation being the major problem. "It was amusing, laughing at a representative of the Planned Parenthood Foundation from out of the country," he chuckled wryly. Yet few laymen seem to understand the significance of an expotential curve.

The main problem seems to be, "How are we going to keep the boys back on the rubber plantation now that they've seen Maverick." This problem, however,

may be safely left to Firestone, whose 99-year lease on half the plantations harnesses them to the problem of where the next batch of rubber is coming from.

Tyler's successor in the speaker's program is the AUFS representative John Hennesian, discoursing on Scientific Careers in Polar Regions. Since Hennesian is neither a scientist nor an arctic explorer, his knowledgeable talk should provide valuable insights.

One need only show up in the Chandler Greasy at 6:30 Monday to partake of these gems of food and wisdom.

The Unitarian Fellowship for Social Justice presents

A series of Three Seminar Lectures

by

Martin Hall

Wednesdays, Jan. 25, Feb. 1 and Feb. 8 at 8 p.m.
First Unitarian Church, 2936 W. Eighth St., L.A.
Tickets: Individual, \$1.00; Series, \$2.50

SPACE TECHNOLOGY LABORATORIES

INVITES

GRADUATE STUDENTS

to discuss careers in the space sciences with members

of its technical

staff when they visit your campus on

JANUARY 26 AND 27

Space Technology Laboratories, Inc. of Los Angeles, California, maintains a large staff of skilled specialists who are devoted entirely to the research and development of advanced space and missile systems.

Recent STL achievements include Explorer VI and Pioneer V, for which STL had complete systems responsibility. In addition, STL provides systems integration and test for the major Air Force Ballistic Missile Weapon Systems.

You are urged to see our representatives if your interests are in any of the following challenging fields:

- | | |
|-----------------------|----------------------------|
| Theoretical Physics | Antennas and Microwaves |
| Magnetohydrodynamics | Telecommunications |
| Experimental Physics | Inertial Guidance |
| Solid State Physics | Electro-Mechanical Devices |
| Applied Mathematics | Analog Computers |
| Digital Computers | Engineering Mechanics |
| Space Communications | Aerophysics |
| Computer Design | Applied Aerodynamics |
| Radar Systems | Propulsion Systems |
| Guidance & Navigation | Systems Engineering |

Please make arrangements with your placement office for interview appointment.

If unable to see our representatives, you may contact STL by mail.

Address your resume to: College Relations, Space Technology Laboratories, Inc.
P. O. Box 95004, Los Angeles 45, California.

SPACE TECHNOLOGY LABORATORIES, INC.



Basketball

(Continued from page 1)

mustered enough hustle and desire to thwart the Orangemen's attempt at scoring 100 points. In a display of questionable sportsmanship, the visitors tried to speed up the game in the last quarter, continually utilizing an all-court press, in an attempt to run the score over the century mark.

Drugs Sundries Cosmetics Tobaccos

**CALIFORNIA REXALL
PHARMACY**

555 S. Lake SY 2-3156
Breakfast Lunch Dinner

THE CAMPUS BARBER SHOP

New Location:
South End of T-4

ALL HAIRCUTS
\$1.50

Two Barbers to Serve You

Fish On The Move; End Near

(Continued from Page 5)

plained, the point of the fish body which travels the farthest outwards from its mean position should move astern at a speed faster than the speed of swim. For what is the equivalent to this statement, the quantity called reduced frequency (which is defined as the length of the fish multiplied by the frequency of the tail beat and divided by the speed of the swim) should be greater than one.

A certain observation on swimming trout provides this information:

Trout length — 1.5 inches; tail beat frequency—24 per second; speed of swim—26.4 inches per second.

Trout length — 11 inches; tail beat frequency—16 per second; speed of swim—114 inches per second.

The reduced frequencies of these two cases are, respectively, 1.36 and 1.55. Both numbers are more than one and therefore are well in support of the conclusion of the theory. For wide varieties of fishes, this quantity is perhaps not much greater than one.

From this it is not difficult to realize that tail beat frequency is roughly proportional to swim speed, as noted by several observers. At slow and moderate swimming speeds, the theory indicates that efficiency can be quite high—of the order of about 80 to 90 per cent.

From his study of the structure of the vortex wake behind the fish, Dr. Wu also found (in an idealized picture) that by neglecting the viscosity of the water, the vortices shed by the fish result in a jet of water that moves quite rapidly downstream

from the fish when it develops a forward thrust.

This backward jet current brings with it a backward momentum. Hence by the mechanical principle of action and reaction, a forward thrust results as the reaction. In reality this jet is slowed down by the viscosity of the water, and virtually disappears when the fish cruises steadily on. However, the jet can be observed if a fish is fighting hard to get off a hooked line.

Another question concerns the viscous drag experienced by a swimming fish. Many observers contend that fish and sea mammals apparently experience unusually low drag.

A possible explanation, according to Dr. Wu, is that the pliable skin or the waving motion of the fish may maintain

a laminar flow and prevent the development of turbulence in the water along its body. This turbulent friction and drag are several times higher than laminar skin friction.

Recently, Dr. Wu added, scientists discovered that turbulence is suppressed in water that flows over a pliable rubber wall covering a rigid surface if there also is water between the wall and rigid surface.

On the other hand, Thomas G. Lang, aeronautical research engineer at the Pasadena NOTS office, found in experiments with a trained porpoise that the drag of the porpoise is essentially the same as that of an inanimate body of the same size. Whether this finding will completely let off the steam of this highly attractive subject remains to be seen, Dr. Wu said.

Announcements

GOLDSTONE FIELD TRIP

There will be an IRE-AIEE sponsored field trip to Caltech's Goldstone Satellite tracking facilities this Saturday, January 21. To sign up and for further information contact Richard Drew, 48 Dabney, SY. 2-3065.

JUNIOR-SENIOR PROM

been tentatively scheduled for May 20. If this conflicts seriously with any plans already made, would the person concerned contact Don Forrest, senior class president, with a note in the "F" box in Ricketts.

Laymen Solve Award Problem

Most of the men who as early as last week received awards for participation in fall athletics should give a vote of thanks to Fred Hameetman and Spicer Conant, who took it upon themselves to see that the shipment was finally made from the Whiting Awards Company.

They lost track of the shipment while it was in transit, but finally located the awards by discovering that the Caltech receiving office had sent a note to Bob Juola of the Board of Directors, saying the awards were here; the Board, however, had returned it since Mr. Juola had left school and was no longer on the BOD.

So if you're without the letter, sweater, jacket, or horse-blanket that you earned, see either Spicer Conant or Fred Hameetman in Page House.

Hanessian To Discuss Antarctica

(Continued from page 1)

rent events class and upon his return to Tech will be interviewed by the International Affairs Staff of the California Tech. Monday evening he will speak to the Upper Class Diners' Club on "Possibilities of a Scientific Career in the Polar Regions."

Tuesday, January 24, at 11:00 a.m., Hanessian will speak to the H 5 students on "The Polar Regions and their Significance." He will lunch at the Athenaeum with the H 5 staff and Tuesday evening will attend H 124, discussing "National Drives in the Polar Regions."

Wednesday, January 25, he will show a film at the YMCA Luncheon Forum at the Athenaeum and will have dinner in one of the Student Houses that evening.

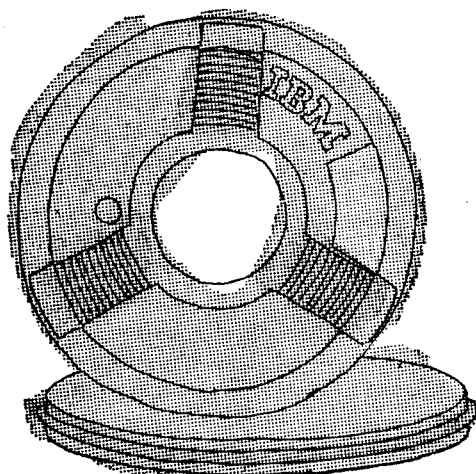
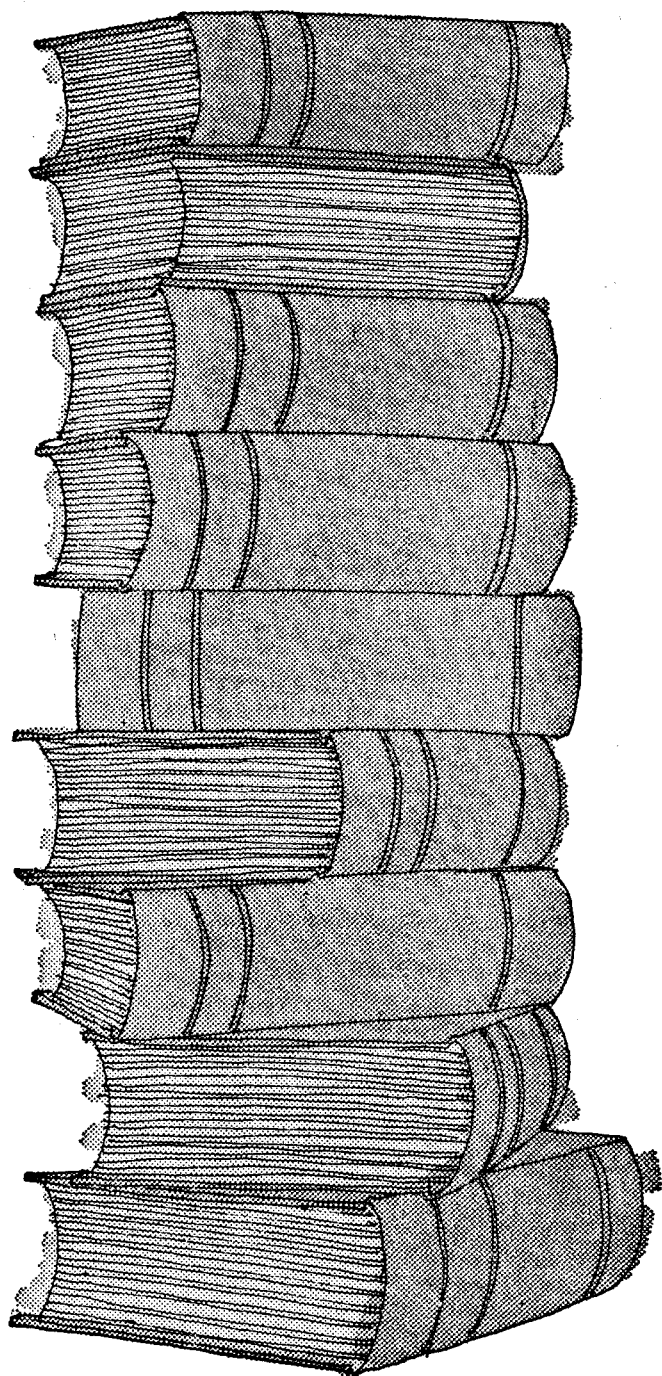
Thursday, January 26, at 8 and 117 a.m., Hanessian will attend Econ 100 classes, discussing "Arctic resources and their accessibility." Thursday noon he will attend the "Y" graduate sack lunch and will have dinner with Prof. and Mrs. F. C. Lindvall.

Hanessian will be staying in Ricketts Guest Suite until Friday, January 27, when he will move to the Athenaeum to be joined by Mrs. Hanessian. Further information on his schedule will be published next week.

Water Fight

(Continued from Page 2)

stated by Joel Donnelly, IHC Editor's Note: C.S. is a contemporary Tech phrase meaning "Caltech Sissy." president, is "The BOD is C.S." The IHC was unanimous in this opinion.



GETTING DOWN TO CASES...WITH AN ELECTRONIC COMPUTER

A young lawyer may spend many years searching through the countless volumes in a law library before he ever gets a chance to plead a case. His job is to research the cases which may provide legal precedent. It's a very necessary but tedious task.

Recently it was demonstrated that an IBM computer could accomplish electronic retrieval of statutory law. Nearly 2,000 statutes pertaining to a specific area of the law were stored in the computer's memory. In response to inquiries, the computer searched its memory at electronic speed and on instructions pointed out either citations or the full text of relevant statutes. This was accomplished in minutes. It might have taken a young lawyer the entire day.

Putting computers to work in unusual ways is not new at IBM. Computers are now doing remarkable jobs in interesting and important areas of business, industry, science and government.

If you are interested in a company that offers you an exciting career with virtually unlimited growth potential, then you should investigate IBM. Positions are open in research, development, programming and manufacturing.

The IBM representative will be glad to discuss any one of these fields with you. Your placement office can give you further information and arrange for an appointment. Or you may write, outlining your background and interests, to: Manager of Technical Employment, IBM Corporation, 590 Madison Avenue, New York 22, N.Y.

You naturally have a better chance to grow with a growth company.

IBM

Ricketts Whips Darbs, Leads Discobolus Race

Ricketts defeated Dabney, 6-0, in a recent Discobolus football game to take undisputed lead in the Discobolus race. With one second to go on the Dabney five-yard line, Scurv Jim (Tex) Morrow threw a wobbly pass, which, when deflected by Darb Dave Osias, fell into the hands of surprised Ben Burke.

Ricketts saved its strength for the last series of plays. Successfully outmaneuvering the Dabney line, Morrow mixed running and short passes effectively, to set up the final touchdown, after Chuck Ray had intercepted a Siegel pass at midfield to give Ricketts the ball. Ray was spark-plug of the Ricketts line at center. He was influential in stopping many of the Dabney threats.

Page, next in line, delivered a challenge in water polo, tennis, and handball. Both Houses are currently in the process of an extensive development program in the sport of handball, with the match on Saturday.

Errata

Last week's feature story, headlined "Faculty Sadists, Not Bad Eyes, Cause Problems," was a fictional article written by Tech Managing Editor Roger Noll.

Interviews

(Continued from page 4)
Westinghouse Electric Corp.—BS, MS/EE, ME, Ph; Summer—Jr.
(*)—Citizenship required for employment.

Your Activity Card May Bring a Free Pizza From

ROMA GARDENS

1120 E. Green

Call SY 2-9748 for Speedy delivery service
15% OFF TO ALL TECHMEN

UCLA Committee on Fine Arts Productions Presents

AN EVENING WITH

STEVE ALLEN

Saturday, Jan. 21, 8:30 p.m.

At Royce Hall

Tickets, \$3.00, 2.50, 2.00, available at Royce Hall Box Office

For information call GR 8-7578

Poet's Eulogy

(Continued from page 4)
thought, to the somewhat comforting, more realistic thought that "For all is known that man is yet for to know."

Crill died soon after "Parcels in the Dust" was published, on the eve of Saint Patrick in 1893.

He left no heirs to his poetical works, and was never married. His literary career is matched closely by his name, James McLaughlin Crill: a modest beginning, a common middle, a strange end.

"Publicize the fact that promotion is on a merit basis."

"Most students have a wrong impression of the operation of a telephone company."

DID WE GOOF?

"Why don't you print a leaflet publicizing the many advantages of work with your company."

"Include reference to the fact that while salary may be \$X at the start, by 'm' months it can be \$Y and after 'n' years it could be \$Z."

"Point out that in your Management Development Program a man STARTS as management."

"Give a hard sell on your stability as an industry, on the constant changes and challenges in the various fields of the communications industry, on your sickness, pension, disability plans, etc."

THESE QUOTATIONS came from college professors at various colleges. They indicate that we may have "goofed" by not "Selling" what we have to offer. Obviously we can't tell our whole story in an ad. If your interest is in management opportunity—whether technical or non-technical—plan to see us when we are on campus. See your Placement Office for date.



Pacific Telephone

look to Berlitz for languages!



BERLITZ
School of
LANGUAGES
82nd Year

GERMAN, RUSSIAN, FRENCH

You can speak any foreign language fluently in an amazingly short time!

CALL FOR A FREE TRIAL LESSON

170 So. Lake Avenue, Pasadena SY. 5-5888

Also Los Angeles, Beverly Hills and Santa Ana
Air Conditioned Studios Free Parking

PIONEERING IN SPACE RESEARCH VIA SPACECRAFT

PLAN YOUR FUTURE WITH THE LEADER IN SPACE SCIENCE

Since the beginning of his intellectual awareness, Man has looked upward to the outer void surrounding his planet Earth. He has watched the twinkling stars and wondered at the never-ending dance of the planets around the Sun. He has dreamed and written of the possibility of exploring outer space and speculated endlessly on what he might find could he but explore those silent spheres.

A practical beginning to these century long yearnings has already been accomplished with man-made satellites already girdling the Earth. Now, the next stage is under way—the daring attempt to explore the Moon and the planets of our Solar System and their environments.

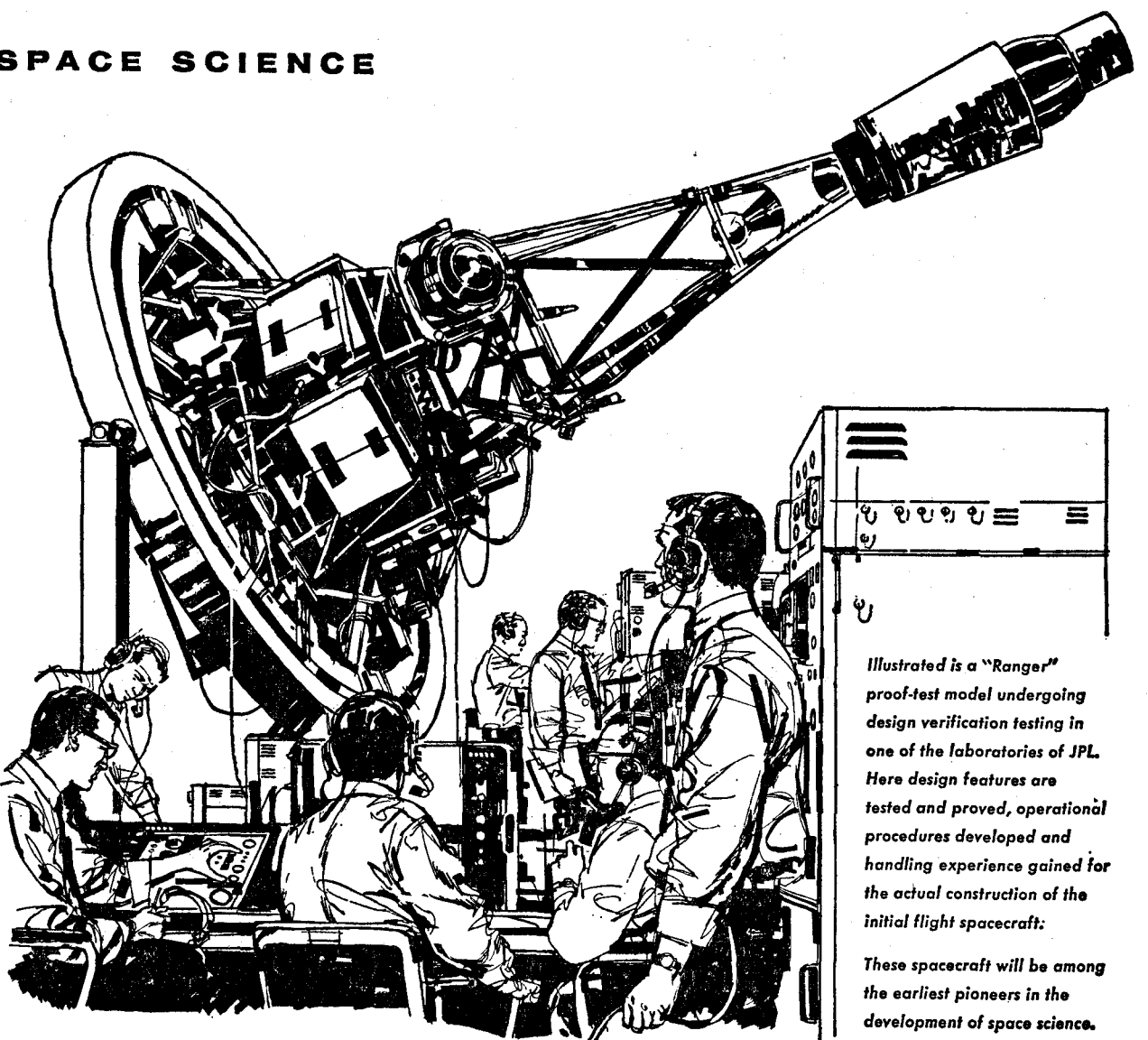
The National Aeronautics and Space Administration has assigned Caltech's Jet Propulsion Laboratory (JPL) the responsibility for the Nation's program of unmanned lunar, planetary, and interplanetary exploration. The objectives of this program are to contribute to mankind's fundamental knowledge of space and the space environment and to the development of the technology of space exploration. For the next ten years, as larger booster vehicles become available, spacecraft with ever-increasing scientific instrument payloads will be developed.

JPL will conduct the missions, utilizing these spacecraft to orbit and land on the Moon, to probe interplanetary space, and to orbit and land on the near and far planets.

Earliest of these spacecraft will be the "Ranger" series now being designed, developed and tested at JPL. The mission of this particular series will include first, exploration of the environment and later the landing of instrument capsules on the Moon.

Subsequent steps will continue a constant probing for the knowledge of what is beyond and will require all the skills, ingenuity, courage, endurance, perception and imagination that men can bring to the task.

Never before has such a wide vista of opportunity, or a greater incentive been open to men trained in all fields of modern science and engineering. Every day at JPL new problems arise, new theories are advanced, new methods tried, new materials used, and new principles discovered. Wouldn't you like to be part of this exciting activity?



Illustrated is a "Ranger" proof-test model undergoing design verification testing in one of the laboratories of JPL. Here design features are tested and proved, operational procedures developed and handling experience gained for the actual construction of the initial flight spacecraft:

These spacecraft will be among the earliest pioneers in the development of space science.



JET PROPULSION LABORATORY

OPERATED BY THE CALIFORNIA INSTITUTE OF TECHNOLOGY
UNDER CONTRACT WITH THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
PASADENA, CALIFORNIA



OPPORTUNITIES FOR GRADUATE STUDENTS IN THESE FIELDS

INFRA-RED • OPTICS • MICROWAVE • SERVOMECHANISMS • COMPUTERS
• LIQUID AND SOLID PROPULSION • STRUCTURES • CHEMISTRY •
INSTRUMENTATION • MATHEMATICS • SOLID STATE PHYSICS
• ENGINEERING MECHANICS • TRANSISTOR CIRCUITRY •

ON CAMPUS INTERVIEWS

JANUARY 20