



LUSATIA IS THE PROUD POSSESSOR of a mighty military machine, although its intelligent generals are by nature inclined toward only peaceful activities. This cultured military organization has as its chief of staff, a highly educated gentleman of the aristocracy, Field Marshal Kasimer Biertrager, seen above, left.  
THE UNIVERSITY OF JOCKDORF, world famous center of learning, is noted for its many renowned scientists. Above are two of the nation's best chemists eagerly engaged in atomic research. Note the expressions of intense interest and the fascination in their work.

## League Leading Caltech Varsity Meets Oxy Five Tomorrow Night

### Spring Socials For Seniors Set

Bud Mittenthal, senior class president, announced the following social affairs for this spring. The date of Ditch Day, possibly the even most eagerly awaited by the less temperate seniors, must as usual remain a dark secret until D day minus one. The traditional ingredients of Ditch Day are, of course, sand, sun, sea water, and—beer, to which is being added this year a dance, to climax the day. Any senior caught on campus after 8 a.m. is considered fair game for the other classes.

The Junior-Senior Garden Party will be held in Dabney Garden Sunday afternoon, May 9th; Class Day, June 10th; and the Junior-Senior Prom, June 11th. The Prom this year will be a Dinner-dance with the dinner as an added optional feature (for a nominal fee, of course.)

Orders for Class rings (at \$26.73 each,) senior announcements, invitations and cards can be placed with any of the senior class officers at any time. In addition Bob Davis will be in Lower Throop Mondays and Wednesdays from 12:30 until 1:00 and Mondays from 11:00 until 12:00 to take your orders. The deadline date for placing your orders for announcements, invitations and cards is Feb. 12 (two weeks from today.)

### Tau Bates Offer Tutoring Service

The Caltech chapter of Tau Beta Pi, honorary engineering scholastic society, has recently decided to extend its program of tutoring freshmen and sophomores. This program has not received the expected amount of attention from lower classmen in the past, but it is hoped that students will take increasing advantage of this extraordinary service offered by the Taubates.

#### Files in YMCA

Any freshman or sophomore who needs help or additional instruction in any first or second-year subject is invited to call at the YMCA office, where a file of instructors' names is kept. The student can then arrange tutoring hours with the instructor who is assigned to him. Special arrangements may be made for instruction in more advanced classes.

About twenty-five instructors are available for this service, all of them members of the Tau Beta Pi. The instruction, of course, is completely free and is offered as a service to the student body by the Tau Beta Pi.

### AIEE Chapter to Take Telephone Company Tour

Caltech electrical engineers will have an opportunity to see all phases of telephone station operation next week when the AIEE and IRE student groups will visit the Southern California Telephone Company's Central Station in Downtown Los Angeles. This station handles incoming and outgoing radio network broadcasts of nationwide programs, as well as the long distance telephone connections with the Los Angeles Area.

The field trip will be made in two sections in the interest of a more personal tour, and to avoid students' conflicting schedules. The dates are Monday and Friday, February 2 and 6, both groups leaving Tournament Park at 12:45 p.m.

### Pep Band Featured at Pre-Game Rally Set For Friday Assembly

#### Injury-Riddled Engineer Quintet Given Even Chance to Trip Second Place Tigers

Rally Commissioner Jack Ottestad announced today that tomorrow's 11 o'clock assembly will be devoted to a pep rally for tomorrow night's varsity and frosh games with the arch-rival Occidental Tigers.

The Oxy varsity is in second place in the league with a 4-1 record, and will be at full strength. Nevertheless, the Beavers, without the services of both first-string forwards, will be given an even chance of duplicating their earlier 57-54 win.

### Labor Adviser To Give Talk at CES Assembly

In line with its policy of attempting to complement the technical engineering training here at the Institute, the Consolidated Engineering Societies will present, at next Monday's assembly, a talk on the position of the engineer as an employee of an average manufacturing concern.

The speaker will be Mr. Irvin Stalmaster, a labor relations consultant in the Los Angeles area. Mr. Stalmaster has a wide background as a member of the bar and on the bench in Nebraska before coming to the coast.

#### Engineer Unions

The talk, entitled "Labor Relations of the Engineer," will discuss the problems that the engineer is faced with both as a supervisor and as a subordinate. In addition, the practicability of the engineer joining existing unions or organizing special ones for his own purposes will be examined. Inclusion of the latter topic was prompted by the growing tendency among the engineering students at Tech to plan to use their training here merely as a background for a career in some little related field, "because there's no money in engineering."

The time of the assembly will be 11:00 A.M. The place—201B.

#### SAE Field Trips

The SAE is completing plans for three field trips this term to the General Motors Assembly Plant in South Gate, Firestone Rubber, and Pacific Airmotive in Burbank. The SAE and ASME members will receive letters asking whether they will attend. In addition, notices will be placed on the SAE bulletin board outside the ME building where non-members may sign up. It is expected that all those interested will be able to attend, regardless of society membership.

### Interview Schedule

JANUARY 27, 28 and 29—THE PROCTER & GAMBLE MANUFACTURING CO., Long Beach, Calif. Mr. Mills S. Hodge and Mr. D. M. Watt—Open Interview for UPPER HALF OF CLASS scholastically, personality, extra-curricular activities, senior and Graduate Students in MECHANICAL ENGINEERING, CHEMICAL ENGINEERING, APPLIED CHEMISTRY, ELECTRICAL ENGINEERING, CIVIL ENGINEERING, CHEMISTRY, PHYSICS. FEBRUARY 2 and 3. THE UNITED STATES AIR FORCE, Major Wm. S. Cope, 1st Lt. James Welsh, 1st Lt. Harry Bock and Captain Paul Oliver will be in Room 205 Dabney Hall from 8:30 to 4:30 p.m. for private interviews with interested candidates to discuss and answer any questions. No definite appointments; go at your convenience for a private discussion.  
All interested are invited to attend a GENERAL TALK by the officers on FEBRUARY 2 at 4:30 p.m. in 206 Dabney.  
FEBRUARY 3 and 4—NORTH AMERICAN AVIATION, INC. Mr. Phillips, Mr. Nance.  
MS Prof. PhD's in top 1/3 of class interested in AERODYNAMICS and STRESS ANALYSIS.  
All MS's and PhD's in PHYSICS, MATHEMATICS, ELECTRONICS interested in the field of AERO-PHYSICS.  
All MS's and PhD's in CHEMISTRY interested in PHYSICAL RESEARCH, PROPPELLANTS AND FUELS DESIGN.  
BS's in CHEMISTRY in top 1/3 of class interested in PHYSICAL RESEARCH.  
FEBRUARY 10—RESEARCH LABORATORIES, Detroit, Michigan, Mr. Fuller, Senior and Graduate students in CHEMICAL AND MECHANICAL ENGINEERING in upper 20 per cent of class scholastically and who are interested in internal combustion engines and fuels.  
(Continued on Page 4)

## Big Sorb Benefit Rally Set

### Dabney To Be Hosts To Post-Game Dance

This week Dabney will act as host for the post-game "open house" Friday night. After the basketball game at Loyola, the Dabney Lounge will be available for dancing until the customary closing time. As usual, refreshments will be served.

On Saturday Dabney returns to its own social program, which schedules a theater party for that evening. After attending the performance of "Maid in Heaven" at the Pasadena Playhouse, the couples will return to the lounge for dancing.

The two exchanges held last week at Dabney proved to be quite successful. On Friday night the Dabneyites were hosts to the girls from Muir, and on Saturday they entertained several "restricted" clubs from Pasadena City College (and fifteen girls from Oxy.) Balloon, broom elimination and flashlight dances were used occasionally to break the ice, but momentum did the job quite nicely.

Several of the men did quite well for themselves—especially Dick Spellman, who let it be known that he had enough phone numbers to last him the rest of the year. Those who didn't do so well—take note.

### Campus Calendar

**THURSDAY, JANUARY 29—**  
Upper Class Luncheon Club at the training table, 12:00.  
Glee Club Rehearsal in Throop Club, 8:30 p.m.  
Throop Club Meeting, 12:20 p.m.  
**FRIDAY, JANUARY 30—**  
Student Assembly, 11:00 a.m.  
Basketball Game, Caltech vs. Oxy, here.  
After-game Open house at Dabney House.  
**SATURDAY, JANUARY 31—**  
Basketball Game, Caltech vs. Loyola, there.  
Blacker, Record Dance.  
Dabney, Theatre Party.  
**SUNDAY, FEBRUARY 1—**  
Musical in Dabney Lounge, 7:30 p.m.  
**MONDAY, FEBRUARY 2—**  
Student Assembly, 11 a.m.  
Y Forum Meeting, Dr. Hunter Mead, Dabney Lounge, 7:30 p.m.  
**TUESDAY, FEBRUARY 3—**  
Newman Club, Dabney Lounge, all Catholic students invited, 4:15 p.m.  
Band Rehearsal, Culbertson Hall, 7:30 p.m.  
**WEDNESDAY, FEBRUARY 4—**  
Frosh Luncheon Club at the training table, 12:00.  
Orchestra Practice, Culbertson Hall, 7:30 p.m.  
Y Cabinet Meeting, Y Lounge, 7:15 p.m.  
Dancing Class, Culbertson Hall, 7:30 p.m.  
Fencing Club, Dabney House, 7:30 p.m.  
**THURSDAY, FEBRUARY 5—**  
Upper Class Luncheon Club at the training table, 12:00.  
Glee Club Rehearsal in Throop Club, 8:30 p.m.  
Throop Club Meeting, 12:20 p.m.

### Oakmont Country Club Chosen as Location of Titanic Sympathy Dance

#### Hal Loman to Furnish Dance Music Jim Hawthorne to Judge Sorb Dress

Pro-Sorb sentiment has reached such a peak, that it is felt that the ASCIT should do something about this. In an effort to bring even more attention to the plight of Lusatia (also known locally as Lausitz) and to raise sympathy for these struggling people, the ASCIT is going to throw a dance on Saturday the 21st of February at the Oakmont Club in Glendale.

### "Y" Luncheon Club Continues Series On Religious Beliefs

The second in an interesting series of talks on *The Beliefs of Mankind*, entitled, "What Catholics Believe," will be given by Father James O'Reilly at the Upperclass Luncheon Club this noon, held at the training table under the sponsorship of the Tech Y.

Father O'Reilly is familiar to most Tech students as a graduate student in Physics. In addition to this, he is the sponsor of the Newman Club, the campus organization for Catholic students.

Following Father O'Reilly in this series, the Upperclass Luncheon Club will present as speakers during the coming weeks, a Protestant Minister, a Jewish Rabbi, a Hindu, and a Moslem.

Bill Woods, as chairman of the Upperclass Luncheon Club, extends a cordial invitation to all upperclass men to attend this stimulating series of talks.

### Sex At "Y" Forum Next Monday Night

The Winter Sex Series of the Y Forum Program will commence next Monday evening when Dr. Mead of the Humanities will speak on the subject: "Psychological Danger Spots in a Man's Life." Time is 7:30 in 119 K.

Mr. des Plantes' "Enjoyment of Music Through Art," witnessed last Monday evening to a capacity audience in Dabney Lounge, was more than anyone expected. His assertions regarding the trends of Modern Art and Life in general provoked intense discussion.

It will be a costume affair in so much as everyone is to come dressed as a Sorb. Dance music will be furnished by Hal Lomen (not a Sorb) with the intermission music consisting of Dixieland Jazz by Nappy Lamare. Jim Hawthorne, the well known Sorb, will be there to judge costumes.

#### Bogache Devaluated

Admission will be only 40 Bogaches, but the Lusatian Bogach has been so devaluated that 40 of them equal roughly zero dollars.

#### Sorb Assembly

In addition, there will be a Sorb assembly on Friday the 13th of February. Some authentic Lusatian photographs will soon be posted around the campus so that everyone will have a fair idea of what Sorbs look like.

#### Investigate Lusatia

In an effort to be impartial, we have checked on affairs in Lusatia. (Continued on Page 4)

### Films, Slides on Subways Shown to Campus ASCE

Last Monday's ASCE meeting featured a program on the building of the Chicago subway system and included a film and series of lantern slides furnished by the senior society. While the film left much to be desired, the slides were shown with an informative lecture by Bud Carroll, who in spite of certain mechanical difficulties, presented his subject with considerable skill. Over fifty CE's attended the meeting.

#### Theatre Party Planned

President Waters announced that the "Drunkard" theater party, which at least nineteen couples will attend, will be held Friday night, Feb. 20. The tickets will cost \$4.00 per couple (possibly less). Any member who desires to go but has not signed up should contact one of the officers as soon as possible.

### Bridge Battle Waged, Results Out Today

The first bridge tournament of the year was held at 7:30 last night in Throop Club lounge, where teams from the four houses gathered to battle wits and memory in an effort to bring honor to their house. Results of the tournament, which were tallied too late for this edition, will be posted on the respective house bulletin boards early today.

#### Blacker Defends

Scoring was based on the two top teams from each house, and the house which racked up the highest score won the privilege of displaying on its mantel the Interhouse Bridge Trophy. Unless last night's battle resulted in capturing said trophy for a new victor, it can be seen in Blacker House, where it has rested for the last year. This trophy, like the Interhouse Bowling Trophy, was given by Colonel Goldsworthy in hopes that it would stimulate competition.

At present plans are being considered for sponsoring an intercollegiate bridge tourney among Tech, S.C., UCLA, and other adjacent schools. Probably the event will not take place until the houses have held a few more contests which will help in making a choice of teams to represent the school.

### Frosh Luncheoneers To Hear Mason Next Wed.

Dr. Max Mason, chairman of the Observatory Council, will be the speaker at next Wednesday's frosh Luncheon Club gathering, it was announced today. Dr. Mason is the preeminent authority on the history of the 200-inch mirror.

Bruce Worcester was yesterday's speaker. His subject was "Student Government at the Institute."

### Dean Franklin Thomas To Host at Sunday Fireside

Tom Tracy announces that this week's fireside will be held at the home of Dean Franklin Thomas. Dean Thomas is faculty sponsor of the fireside program as well as dean of upperclassmen. Men interested should get their names on the sign up lists in the student houses and YMCA as soon as possible.

#### LATE NEWS FLESH!

**Bebbling Brook Krankhaus:** Dr. Ernst Zwick reported today that Patient Mnoop is progressing at a satisfactory rate. The only difficulty is his assumption that all the female nurses are communal property. (See Page Four for Details)

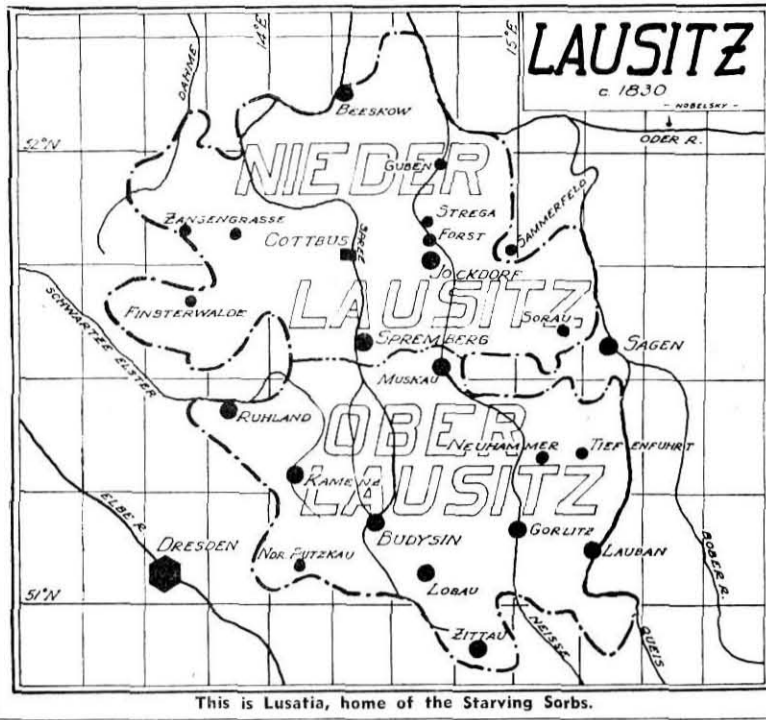
### The California Tech

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### Shabings from the Board

By Das Muehl

#### Honor Keys

It is worthwhile to repeat here a portion of the Wolfeins' column of last week. He wants all men who have earned, or think they have earned over 50 honor points this last school year, should turn in applications of any member of the Board.

This application should list all jobs held, your NAME and class. For information concerning the number of points, look into the Little T, and the latest dope will be found.

#### Sundry Items

A lot of business was transacted but it was of minor significance and there is no need to waste valuable space on it. However, there is one point I want to bring up because it concerns the Glee Club and its director, George Drapes.

The Glee Club was just given a grant of money to buy music with on the stipulation that George Drapes take the solo in "The Road to Mandalay," which will be sung at the next assembly to be given by the Glee Club. Rumor has it that he does a bang-up job of it and that it is well worth hearing. The plug is free, George, courtesy of the ASCIT Board of Directors.

**For What It's Worth**  
Throop saw, for the first time in years, some honest-to-good- (Continued on Page 4)

### Talkin' It Over

with The Goon

"It never rains, it pours."

#### Pellet Heavers Worked Over

Haven't said too much lately about my old pals in the Inner Sanctum. "Dean" Anderson has been spending a considerable portion of his time getting every guy on the campus to put the pellet. It seems as if Andy has changed his line. No longer are we greeted with, "How much you weigh, son?" It's "How far can you heave that shot, boy?"

If Andy can get as fine results from the track material he is presented with, he'll have the weightmen throwing the hardware out of the park. Big Jim has started his get-tough policy. The P.E. regulars are feeling the sting of the lash daily as Jim tries to put enough guys in shape for the varsity squads.

#### Fresh Melon Manglers Improve

Can't say too much about Ed. His actions speak far louder than words. His frosh casaba (Continued on Page 4)

## CAMPUS BREWINS

This last week-end should have enabled a lot of frustrated students to meet a bunch of members of the opposite sex, judging from the tremendous number of exchanges.

Blacker had one Friday with some local working girls. Doug MacLean was noted publicly flexing his muscles and I might add that the woman he disappeared with early in the evening was one of those who were more desirable physically. By late Sunday night he had still not been seen.

And then there were people like Howard Cohan, who had somewhat different experiences. He plunged into the fray quite eagerly, but later in the evening after tearing himself away from the clutches of some maiden whose better qualities were certainly not among the more worldly ones, he confided that he had a somewhat horrible time.

**Dabney Does It, Too**  
Dabney had exchanges on both Friday and Saturday nights. On the latter night Sage Burrows was seen monopolizing some very sharp-looking wench in a red dress. After it was all over, he claimed that, as attractive as she was, she was still below his minium standard, but she just wouldn't let him go.

Len Herzog finally broke down and brought his sis, Jill, who lived up to advance notices, and the Frosh and overs tripped over each other in the rush. Several of them, including new Froshpres Wood, got to know her better afterwards, according to people trying to sleep near by.

Herzog himself, however, seemed to be still unrecovered from his Thursday night effort, when he brought a highly desirable model named Bobbie to supper, etc. He explained his empty sack the next morning by saying he'd stayed at home in Hollywood "because of the fog."

#### Cox and Salami

After the game on Saturday night, Warren Marshall and Art Cox with dates were taking on a little refreshment when Art and his woman got onto a rather odd

conversation about salami while she wildly gesticulated with one to emphasize her points.

Cox and date eat salami, too. But the big news is the disgusting conduct of Bud Mittenhal. He's gone overboard on this Sorb affair. At the Blacker exchange while dancing with somebody else's date all he could mumble was, "Where is my salami?" It seems he owned one-eighth interest in one that MacLean was holding. Finally he dragged himself away and soon rushed back waving the repulsive thing over his head, screaming in a raucous manner, "I've found my salami!" to the disgust of dignified Prexy Marshall.

#### Throop Poop

Just about all the campus was at the Throop Open House Saturday night. One of those in attendance was Tom Stix, who danced without shoes and demonstrated his ability to click his heels together twice in the air on one jump—with this violent exercise it's surprising he isn't considerably thinner.

Frank Wolf, Bill Smyth and

dates ducked outside for a few minuets for, they said, a breath of air. It was so — cold outside that when the fellows broke from their respective clinches and came up for the air they originally set out for, they decided things were cozier by a nice warm fireplace.

Miriam, of the Athletic Office, came as the guest of Fleming's smooth BTO Clay Englar. Clay, big-hearted that he is, has expressed his willingness to counsel all the Throop frosh who got a nice fat zero in the Purity test. Take heed boys! Clay's "Young Boys' Finishing Service" can make you a man!

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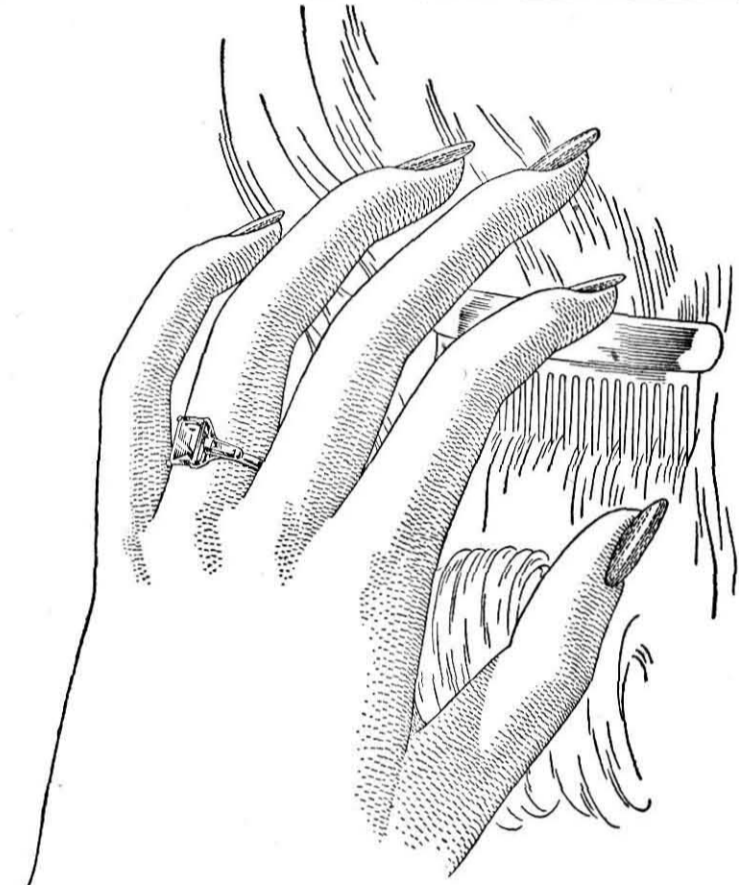
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# Beaver Five Drops Close Chapman Tilt

The Beavers were miles off their game in bowling to a scrappy Chapman outfit last Friday, 47 to 45, and things are definitely going to have to improve if Caltech is to maintain its league lead against the challenging second-place Oxy Tigers tomorrow night.

The favored Beavers started off like a house afire against Chapman as Bill Cox hit two side shots and a free throw without a miss and Bob Stokely dropped in a long shot to give the Engineers a 7-to-9 edge. The Chapman crew found itself momentarily narrowing the Tech margin to 9 to 8 only to have Saltman and Tyson collaborate on five straight baskets, giving the Beavers a 19-to-8 lead.

### Tech Bogs Down

But from that point on the Caltech attack was sluggish and its defense went from bad to worse. Chapman cut the Beaver lead to 21 to 19 at the intermission and during the first ten minutes of the second half the visitors outscored the Engineers, 19 to 14, taking a 38 to 35 lead.

Saltman led a Beaver rally which found the Techmen ahead, 41 to 40 and 43 to 42, but Melton scored on a lay-in with a min-

(Continued on Page 4)

## Frosh Sports Roundup

—By Earl Hefner

To the statistical-minded and those on the Frosh basketball team, this week's Roundup should prove reasonably interesting. In looking over their record for the season thus far, we see that the young cagers are now batting .600 in the win-lose column, having won three games out of five played.

In these five games the Frosh have scored 206 points to their opponents' 234. Greatly responsible for those 234 counters is the Pepperdine Frosh team, which scored 79 against our boys. If we quietly remove that game from the statistics, the Frosh then outscore their other

# Beaver Sports

## Cagers Meet Oxy; Bowen, Furth Out

Conference leading Caltech clashes with the Occidental cagers for the second time in three weeks as the Tiger squad invades the National Guard Armory tomorrow night at 8:15 in an attempt to avenge the recent 57-54 Beaver upset.

Carl Shy's quintet will be hard put to repeat their previous performance. Oxy stock has been bolstered by the return of center Jim opponents by 21 points, which isn't so bad.

### High Scorers

As for those guys who are responsible for making the points, we find Thorne Butler leading the team with 74 tallies, 49 of which were scored in the last two games. Thorne is proving to be very capable at the center position and is deadly on those tip-ins and key shots. After Butler are Sereno, Brewer and Freise, who have collected 38, 34 and 32, respectively. These four, all on the starting line-up, are responsible for 86 per cent of the team scoring. The remainder of the scoring is Kamei, 11; Libbey, 8; Greutert, 7; Fee, 1, and Pardee, 1.

**Sad Performance on Gift Shots**  
The Frosh team has a sub-normal free-throw record of 50 (Continued on Page 4)

Black to the active list, while Ted Bowen and Don Furth will be out of the Tech line-up due to injuries. Black saw only brief action in the January 9 encounter due to a touch of the flu; during his short appearance, however, he gave the Caltech rooters some anxious moments by sinking five consecutive baskets.

Since the Caltech-Occidental game, Oxy has defeated Whittier, 53-46, and edged out Pomona, 57-54. Tech meanwhile trounced Redlands, 50-36. In non-league encounters Oxy beat Nazarene, 65-62, and the Beavers defeated the same school, 56-44. Pepperdine defeated both schools by almost identical margins.

In addition to Black, the Beavers will have their hands full with forward Bob Olsen. Olsen rang up 14 points for the Tigers three weeks ago.

# CALTECH FROSH SINK PANTHER CASABAMEN

The combination of Thorne Butler and Al Sereno proved to be too much for the Chapman J.V.'s last Saturday night as the Beaver Frosh won an easy tilt from the Panthers, 50-31.

The Frosh pair joined their scoring talents to score 10 digits each the first half, and in the second stanza the Tech center added 14 more to his total to give him 24 points for the evening. Butler's frequent tip-ins and forward Sereno's accurate lay-ups accounted for three-quarters of the Frosh scoring.

## Throop Bowls High To Hold Growing Lead

After the smoke cleared from the attic of the Pasadena Bowling Courts this last Monday, Throop Club was seen to be comfortably ahead in the interhouse bowling circuit. By winning 7 out of 8 games this week, Throop extended its lead to six games over second-place Fleming. To date, Throop's two teams have garnered a total of 33 wins; followed by Fleming with 27; Ricketts, 24; Blacker, 20, and Dabney, 16.

### Hottest Bowling Yet

Six men had series over 500, with fifteen games over 180 added to the festivities. High series of the day went to Bill Root of Ricketts with 547, and close on his heels were Bob Levy of Ricketts, 540; Bob Benton of Throop, 539; Ray Heggland of Throop, 535; and Bill Culbertson of Dabney, 534. High game went to Levy with 214, followed by Heggland with 212, and Larsh of Fleming with 202.

By overwhelming agreement it was decided to continue the league an additional eight weeks, so that each team will meet every other team twice. April 26 will now mark the close of league bowling, which takes place every Monday at 4:20 except during finals and vacations.

The contest was the second of a two-game series the teams played this season and the Orange and White repeated the 46-30 victory they obtained earlier. Since Chapman is a non-league opponent, the win does not boost the Beavers in the Freshman Conference standings, but does give them a season record of 3 wins and 2 defeats.

### Sharp in Beginning

The Frosh got off to a quick lead as Sereno and Butler hit a pair of baskets apiece to put the Frosh on the long end of an 8-0 score. Tallies by the Panther center, McBride, and forward Raab brought the Chapman boys within 4 counters of the Frosh at 12-8, but Sereno scored two quick buckets on a beautiful play into the key, and a two-pointer from under the basket with no Chapman player near him. The half ended later with the Frosh ahead, 25-12, as Kamei pushed in a one-hander from the key and Freise dropped a gifter through the hoop.

The Frosh first string began pouring on the heat the final period, after Chapman made a lone two points, by running the count to 34-14 before the Panthers could score.

### Reserves Take Over

Coach Preisler's reserves came into the game as the first string got a well-earned rest. After Dick Libbey had tipped one in following a missed free throw by Kamei, the Panthers began to take advantage of the Engineer subs and promptly narrowed the gap by 10 points to make the

(Continued on Page 4)

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**DU PONT Digest**  
For Students of Science and Engineering

## Rubber accelerators lead the way to new agricultural fungicides

Vulcanization accelerators for rubber and agricultural fungicides would seem to have little in common. But the wide variety of interests of men in the Du Pont organization sometimes result in outstanding developments from such apparently unrelated products.

A rubber chemist suggested to a plant pathologist that derivatives of dithiocarbamic acid, NH<sub>2</sub>-C(S)SH, parent substance of a well-known group of rubber accelerators, be tested as insecticides. His suggestion was based on the possibility that sulfur combined in this form might be more effective than free sulfur, a recognized insecticide.

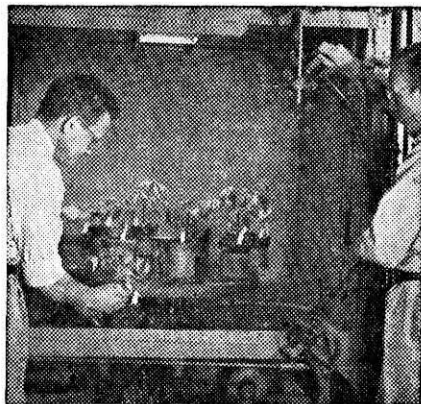
Entomologists and plant pathologists investigated the fungicidal as well as the insecticidal properties of this group. One of the first compounds tested, sodium dimethyldithiocarbamate, (CH<sub>3</sub>)<sub>2</sub>N-C(S)SNa, even in dilutions of 1:30,000, was found to be a powerful fungicide, but somewhat injurious to plant life.

This led to a systematic program of research including other metallic salts, the ethyl, propyl, butyl, phenyl, and other aryl derivatives of the dithiocarbamates and thiram mono- and disulfides, and the related compounds

made from ethylenediamine and morpholine. In this phase of the work, organic chemists played an important role by suggesting various derivatives and preparing them for tests. Later, in cases where proper dispersion and adherence of the compounds to plants were important, the skill of physical chemists was called upon.

In general, the compounds of greater chemical stability were found to be less effective. Fungicidal efficiency diminished with increase in size of alkyl radical, and as aryl radicals were substituted for alkyl. Thus the unusual situation developed that with the exception of the bisethylene (dithiocarbamates), the first and simplest products tested, the methyl derivatives, proved to be the best fungicides.

Iron and zinc dimethyldithiocarbamates, (CH<sub>3</sub>)<sub>2</sub>NC(S)-S-M-S-(S)CN (CH<sub>3</sub>)<sub>2</sub>, are now sold as "Fermate" fungicide and "Zerlate" fungicide respectively, for control of fungous diseases of many fruit and vegetable crops, tobacco, flowers and other ornamentals. Zinc ethylenebis(dithiocarbamate), Zn(-SC(S)NHCH<sub>2</sub>CH<sub>2</sub>NH(S)CS-), marketed as "Parzate" fungicide, has specific action in the control of late



B. L. Richards, Jr. Ph.D., Cornell '44, and A. H. Goddin, M.S., University of West Virginia '32, test efficiency of "Parzate" fungicide in control of tomato late blight and bean rust. Equipment is specially designed laboratory spray chamber.

blight on potatoes and tomatoes. Tetramethylthiuram disulfide, (CH<sub>3</sub>)<sub>4</sub>NC(S)-S-S-C(S)N(CH<sub>3</sub>)<sub>2</sub>, is used in two compositions, as "Arasan" disinfectant for seeds and "Tersan" fungicide for turf diseases.

Overall, the derivatives of these groups of compounds proved to be outstanding as fungicides, rather than as insecticides. Although a marked degree of specificity for different pests was characteristic of the members of this series, it is interesting to note that all three were highly effective. This work offers still another example of how the breadth of interest in a company like Du Pont can lead to worthwhile developments.

Questions College Men ask about working with Du Pont

What are the opportunities for research men?

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Field testing of promising fungicides, including "Parzate" formulations, for control of tomato late blight.



