

and political. Would he, for example, take a public position as to tariff changes which now threaten? Wouldn't he instead trust to his company's experts? He will damn a communist, and unjustly, for following his "party line" and taking opinions from Marx or Moscow; but he can remain blissfully unconscious that he is following a "policy line" without subjecting it to an objective criticism.

He has the brains and the analytical ability to handle these larger questions of social import—I.Q. is usually higher than that of many who do handle them. He has reason to concern himself, for these matters vitally affect all men including himself. But whether or not he considers them, he rarely speaks out and almost never acts. Despite his unique value to society, due to his application of the scientific method, he pulls his punch and fails to follow through. Even as to such a selfish matter as his own remuneration, and its relationship to that of others who produce or acquire, he is usually uninformed, accepting it as a handout like a fellowship grant instead of a reward which should be justly proportioned.

Today in his development he has reached a point where, in the words of a Biblical paradox, to save his life he must lose it. He must, at any rate, make some sacrifice, diverting time and energy from the scientific work that interests him most to the social and economic problems that vitally concern his future and that of all his fellow men. No longer can he safely pass the buck to rely on expertness not his own or that of other men of similar scientific objectivity.

This world of ours already has at its disposal enough products of science to wreck it good and plenty. What it needs is some hair of the dog that bit it. It needs an application to its present problems of the same methods of science as unwittingly provided the mechanisms by which it got where it is. And engineers and scientists must organize to insure that the prescription is filled.

## C. I. T. NEWS

### JOHN MILLS TO SERVE AS STUDENTS' ADVISOR

“WITH obligations to any student but without portfolio’ describes,” says John Mills, “the position in the Institute to which I have recently been appointed.”

Mr. Mills does not engage in research or teaching, and has no responsibilities in Institute management or business affairs. Instead, to use his own words, “I will be at the beck and call of all students, undergraduate or graduate, who wish to consult me unofficially and confidentially about their educational and vocational problems.”

To this work Mr. Mills brings a wide background of experience in industry and in education. He is a graduate in arts from the University of Chicago and in electrical engineering from M. I. T. After 10 years of university teaching he joined the research staff of Bell Telephone Laboratories. Then after 10 years of research and engineering—marked by about

30 patents and by pioneer work in transcontinental wire-telephony and early radio-telephony—he became personnel director with the responsibility of the selection and placement of scores of engineers and scientists each year. This work was followed, until his retirement last year under the Laboratories Pension Plan, by activities in publication and publicity.

He is a fellow in the professional societies of physics, electrical engineering and radio engineering. Mr. Mills has also written 11 books. In the first of these, **Electricity, Sound and Light**, he was junior author to Dr. Millikan, who first excited his interest in physics. His text, **Radio Communication**, was used by the Signal Corps in World War I and is a pioneering treatment of the triode and an exposition of vector methods as applied to radio circuit problems. His latest books have been popularizations. **Electronics, Today and Tomorrow**, is now in its sixth printing, and over 150,000 copies were issued by USAFI during the war. This book is also recorded on phonograph records as a feature of Talking Books for the Blind. His latest book, **The Engineering Society**, published last March, is a provocative study of the scientist as a citizen; and as Harrison Brown said in a recent Saturday Review of Literature, “It contains a bold and comprehensive discussion of salaries and organizational hierarchies in industry.”

To the problems of engineers and scientists, Mr. Mills brings years of sympathetic observation and a cold-blooded knowledge of what manner of men scientists are and what industry should and should not expect of them. Students are taking advantage of Mr. Mills' experience by visiting with him during his regular office hours.

### MEMBERS OF '26 AND '36 TEAMS GUESTS AT ANNUAL GRID BANQUET

ATTENDING the annual Varsity Football Banquet held Dec. 9 at Brookside Municipal Clubhouse were over a hundred students, faculty and alumni, with Dr. J. E. Wallace Sterling, professor of history and government, acting as toastmaster.

Present at the dinner were representatives of the varsity football teams of 10 and 20 years ago. Speakers were President Lee A. DuBridg, Coaches J. Mason Anderson and Pete Mehringer, and Frederick Runyon, editor of the **Pasadena Independent**. The Wheaton Trophy presented on the basis of scholarship, sportsmanship and moral influence was awarded to this year's stellar halfback, Doug MacLean of the junior class. MacLean and Norman Lee, guard, were announced as co-captains for 1946, elected by the team. Twenty-four grid men, 10 water polo men and 6 cross country men received awards.

Members of the 1926 varsity football squad invited to the dinner were: Elmer Muff, Guy Chilberg, George Watson, Phil Cravitz, Clyde Shields, Layton Stanton, Ed Hines, Dick Folsom, Austin Hoyt (Mgr.), Bob Heilborn, Charles Lewis, George Moore, Al Lombard, Bill Mohr, Gary Collings, Frank Nickell, Ray Copeland and Len Ross (Mgr.).

Grid men of 1936 also invited were: Claude Brown, Clay Smith, John McLean, Jack Baker, Carl Larsen, Bill Wetmore, Jim Balsley, Al Zimmerman, Jack Osborne, George Mann, Wendell Miller, Jim Van Horn, John Griffith and Frank Hewett.

## ISSUES OF "TECH" MADE AVAILABLE BY MAIL

THE CALIFORNIA TECH, the official student body publication, is available to Alumni and others interested in student activities at the Institute. For convenience the Tech staff is sending out letters which, when returned with a dollar enclosed, will assure prompt delivery of the paper for the remaining two terms of the year.

The Tech, containing detailed news of student activities at the Institute, besides numerous feature articles and general information, is published every Friday through the school year. Anyone despairing of receiving a letter from the paper may write to The Editor, California Tech, 1201 East California Street, Pasadena 4, California, enclosing one dollar.

Starting with the next issue, January 10, 1947, the paper will be mailed out regularly.

## SECOND WATER TUNNEL OF UNIQUE CONSTRUCTION NEARS COMPLETION

WITH a 72-foot hole, 12 feet in diameter, already excavated below the sub-basement level of the Hydrodynamics Laboratory, the Institute's new high speed water tunnel is taking shape. Water velocities ranging up to 100 feet per second may be achieved in the working section of the tunnel, which will be used for research on cavitation.

Steel casings are now being cemented in the sump pit, which was excavated with the aid of a steel mono-rail installed above ground floor level between the pit head, just north of the entrance to the hydrodynamics laboratory, and the south door. A winch brought dirt from the pit up to a position where it could be rolled down to the door and deposited in waiting dump trucks.

This tunnel is the second to be built at the Institute or anywhere else in the United States. Similar tunnels are planned, but none have been built so far. Construction of the first was started in 1941, but the completed structure, which has a maximum water speed through the working section of 70 feet per second, was used almost entirely for war research. The first tunnel had a 14 inch working section, as will the new structure.

Pressure-velocity relations will be varied in different sections of this tunnel in order to keep air in solution in the flow entering the working section. In this region pressures will be comparatively low. The 72-foot sump pit will be divided into four separate sections by means of a vertical partition through the middle, and five-foot pipes in each of the semi-circular halves. Pressures of about 100 pounds per square inch in this section of the tunnel will force air to dissolve again after being released from solution in the low pressure working section.

The impellers used in the tunnel will be standard commercial pump forms, adapted to be driven from the suction side instead of from the discharge side as is customary with standard installations. Five hundred and fifty horsepower will be available on the impeller shaft. A direct current electric motor is to be used for easily regulated power. The highest speed, 100 feet per second of flow, with full power, will not be used too frequently in the basic studies of cavitation planned.

Balances to measure the reaction of shapes tested will be similar to wind tunnel forms, but somewhat simplified. The working section will be six feet long, with a circular cross-section of 14 inches. Four steel members spaced around the section will hold thick

transparent walls of plexiglass in place to facilitate observation of the object tested.

Design and installation of the tunnel is being carried out by the staff of the Hydrodynamics Laboratory under the supervision of Robert T. Knapp, Ph.D. '29, associate professor of hydraulic engineering, and Dr. Vito A. Vanoni '26, assistant professor of hydraulics.

## TWO WINS, FOUR LOSSES FOR BEAVER FOOTBALL SQUAD

WINDING up with two wins and four losses, the 1946 Caltech football season is over. Missing the services of fullback Douglas MacLean, who received a shoulder injury in the 19-7 defeat by Whittier—third game of the season—the team lost to Redlands, 21-6, and to Pomona, 32-13.

Faring badly in their encounter with the Pomona College Sagehens, the Beavers had an epidemic of fumbling, saw touchdown drives end with scores for Pomona. To open the game Tech received, and rolled 71 yards in four plays. A pass by Chaffee was intercepted on the Pomona 14. On the first play the Hens' fullback, Shoji, cut off right tackle, reversed his field, and raced 86 yards for a touchdown. Before the first two minutes of play were up, Pomona had seven points.

A Tech fumble shortly after the following kickoff opened the way for a Pomona pass which brought the ball to the Beavers' five yard line. Pomona scored on the next play.

Fumbled by Pomona shortly after the next kickoff, the ball was advanced by Caltech deep into the Sagehens' territory. Trouble again hit the Beavers, and Chaffee's pass was intercepted by Malan, Pomona halfback, who carried the ball to the 35, then lateraled to a teammate who ran down the sidelines for a touchdown.

Tech rallied late in the second quarter, advancing the ball 65 yards in eight plays with a pass to Parode for the score.

Pomona scored again in the third quarter with a 90 yard power drive for six points. The last Sagehen touchdown came in the fourth quarter, six plays after Pomona intercepted another Tech pass.

The second Beaver score of the day came after a nine play, 85 yard drive.

On the books the Institute team looked quite good, with 13 first downs to eight for Pomona. The Hens gained 298 yards compared to the Beavers' 281. Further breakdown shows that Tech gained 160 yards by rushing and 153 through passes, while Pomona gained 244 yards on the ground and only 50 yards in the air.

The best playing of the season was seen in the first half of the Pepperdine game with MacLean back in uniform. For 29 minutes and 58 seconds of this period, the Beavers held the Pepperdine Waves, the strongest small college team in Southern California, to a standstill. Late in the second quarter Tech caught a punt on the five yard line and was forced to kick. Pepperdine ran the ball back to the Tech 36, and passed to the eight. Snapping the ball two seconds before the gun went off, the Waves swept wide on a reverse to score. Up to this point each team had registered six first downs, but Tech rolled up 152 yards to the Waves' 105.

Pepperdine's reserve strength proved too much in the second half. Two Beaver drives reached the opponents' 30, but lacked the power to advance further.

## BASKETBALL TEAM OPENS CONFERENCE PLAY IN JANUARY

**T**ECH basketball prospects look fair this year in spite of the fact that only one man from last year's team and only two former lettermen are on the squad. However, besides center Paul Saltman of last year's team, and centers Bob Stokely and Kirk Lewis both of the 1943 team, guard Harry Moore who won letters in 1942 and 1943 will be back in school in January in time to start the Conference schedule.

After losing two practice games to Muir Junior College, the Beavers beat LaVerne College 32-27 and Chapman College 43-35. The only available comparison with any conference teams is Pomona's 46-43 win over Chapman.

## BASKETBALL SCHEDULE 1947

Saturday — January 11 — Loyola ..... at Caltech  
 \*Friday — January 17 — Caltech ..... at Pomona  
 Saturday — January 18 — Caltech ..... at Chapman  
 \*Tuesday — January 21 — Occidental ..... at Caltech  
 \*Friday — January 24 — Caltech ..... at Redlands  
 \*Saturday — February 1 — Pomona ..... at Caltech  
 \*Friday — February 7 — Whittier ..... at Caltech  
 Saturday — February 8 — La Verne ..... at Caltech  
 \*Saturday — February 15 — Caltech ..... at Occidental  
 \*Friday — February 21 — Redlands ..... at Caltech  
 \*Friday — February 28 — Caltech ..... at Whittier  
 Saturday — March 1 — Caltech at San Diego NTC  
 \*Conference games

All home games will be played at the National Guard Armory at 145 North Raymond, Pasadena. The "B" game preliminary will start at 7:00 P. M.

## FINAL WORD FROM REGISTRAR'S OFFICE

**W**ITH Institute students now pre-registered for the Winter term and finishing Fall term final examinations, the Office of the Registrar has finally completed tabulation of the men now taking courses here.

The largest previous peacetime enrollment was 960, in 1941. This year's sees 1372 undergraduates and graduate students in Institute courses.

Larger not only in numbers, but also in percentage, than any previous group, are the 1946-1947 graduate students, with 314 engineers and 267 scientists. The undergraduate enrollment of 791 shows 179 freshmen, 372 in engineering courses, and 240 in science.

The Division of Mechanical Engineering has the largest number of undergraduate students enrolled, but in graduate work aeronautics rates first with 137.

Questionnaires answered by 1350 of the students indicated that 887 are veterans; 448 are married, and 859 single. Failing to indicate their marital status were 53.

Seventy-four foreign students are enrolled, 16 of them undergraduates and 58 graduates. Canada has the largest number, with 16. From China came 13,

India 10, and Great Britain 7. Others represented were: Argentina, 4; Mexico, 3; Egypt, Iran, Ireland, and Turkey, two each; Austria, Bolivia, Chile, France, Germany, Hungary, Italy, Norway, Peru, Poland, Siam and South Africa, one each. One student listed no country.

Only 82 students are at present in the armed services, contrasted with war-time enrollments when at the peak 75 per cent of the students were in uniform. Servicemen enrolled now total: Army, 43 (officers on special training assignments); Navy, 38; British Royal Air Force, one.

## NEXT YEAR'S REGISTRATION

Applications to take the 1947 entrance examinations are coming in undiminished. January 15 is the last day on which these applications will be received at C.I.T. All four entrance examinations in English and chemistry, mathematics and physics, will be given next March.

Transfer to the upper classes will be permitted a number of students who desire to be Institute sophomores next year. No transfers to junior standing in mechanical or electrical engineering will be accepted in 1947.

## REGISTRATION TOTALS

	Sophomores	Juniors	Seniors	U. G. Total	Graduates	Total Students
Mechanical Engineers	66	67	54	187	56	243
Electrical Engineers	60	41	31	132	64	196
Civil Engineers	17	19	17	53	37	90
Aeronautical Engineers					137	137
Industrial Design					20	20
	143	127	102	372	314	686
Chemists	19	13	12	44	74	118
Applied Chemists	24	17	9	50		50
Chemical Engineers					21	21
Applied Physicists	4	5	7	16		
Physicists	43	31	17	91	85	192
Biologists	4	4	0	8	16	24
Geologists	9	8	2	19	29	48
Mathematicians	6	2	4	12	20	32
	109	80	51	240	267	507
Total Engineers and Scientists	252	207	153	612	581	1193
Freshmen						179
Total Students						1372

## "FOX" STANTON

**W**L. (Fox) Stanton, who coached C.I.T. teams from 1921 to 1942, died at the home of his son, Layton, in Olympia, Washington, on Thursday, November 28, 1946. Coach Stanton died shortly after returning from a Thanksgiving Day football game.

Not unknown at Tech when he arrived in 1921, Coach Stanton had grabbed the Southern California Conference football title in 1909, 1910, 1911 and 1914 while coaching at Pomona College, and led Conference champions again in 1916 while at Occidental, when, incidentally, his team beat the University of California, 14-13. At Tech he produced championship teams in 1923, 1930 and 1931. At the time of his retirement in 1942, Stanton had coached more consecutive years at one institution than any other man on the Pacific Coast.

It was at the Institute that he earned the title of "Fox." Never having much seasoned and experienced material at his command, Stanton produced teams which turned in upset after upset over rivals, which admittedly were much stronger potentially. His teams could always be depended upon to pull the unexpected.

Coach Stanton had an almost unprecedented background for coaching football: captain and halfback on the Drexel Institute team of Philadelphia in 1892; halfback, fullback, captain and coach for three years at Pennington Seminary, N. J., from '94-'96; while serving in the Spanish American War in 1898 he

served as coach and captain of his brigade's football team, which defeated the University of Georgia in two games; halfback, fullback at Dickinson College, Carlisle, Pa., from 1899-1902; and captain and coach in his senior year.

Acting on the stage for a year after graduation from Dickinson, Stanton returned to coach at Morristown, N. J., at Hamilton Institute, N. Y., and finally at Pomona College in 1908. Serving with the United States Army in World War I, he was mentor of the Camp Lewis Army team which played the Marines at the Tournament of Roses game at Tournament Park, January 1, 1918. He returned from overseas with the Army to coach Occidental again until he came to Tech in 1921. Besides football, his track teams won the Conference championships in 1926 and 1941.

When he came to Tech there was strong faculty sentiment against football, but it was finally agreed to tolerate a team provided that study time and averages were not sacrificed. Stanton knew that it was a great game if brilliant men played it, but he also knew that it was just a game. He had supreme respect for the mentality of his team and no play was considered too difficult for the minds of his players.

"Fox" Stanton coached eight championship teams in the conference, but will be most remembered for his fine character, sober point of view, and his great sense of humor.

## FALL MINOR SPORTS SEASON ENDS QUIETLY

**T**HE reconversion year 1946 proved a bad one for fall minor sports. Coach Bob Merrick's water polo squad, formed with no returning lettermen and few reserves, played nine games, finishing all on the low end of the score. In spite of practice in an outdoor pool from 4:30 to 6:00 P. M. and the difficulties of reaching the P.J.C. campus for practice, a squad of 14 men remained out all season.

"Doc" Hanes' cross-country men took only one victory in the 1946 season, defeating Santa Barbara 40-20. With four men in the first four places, Redlands had little difficulty in winning the Perpetual Trophy awarded for victory in the Conference meet. This Trophy, which will be kept permanently by the team that wins it three times, was the property of Caltech in 1941 and 1942, the first two years that it was awarded.

## STUDENTS RAISE RECORD \$950 FOR WSSF

**O**VER \$950 was raised last month in a "Y" sponsored drive for the World Student Service Fund. More than \$600 of this amount was contributed by students. The money is to be used for food and clothing, books and medical facilities, for students and faculty in the war-torn Orient and Europe. The administration of the W.S.S.F. funds is handled by a central agency. The practice is to distribute aid equally between Europe and the Orient.

This amount is the largest ever accumulated on campus by a student-sponsored drive.

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