

THE GEAR

THE GEAR
— OF —
THETA TAU

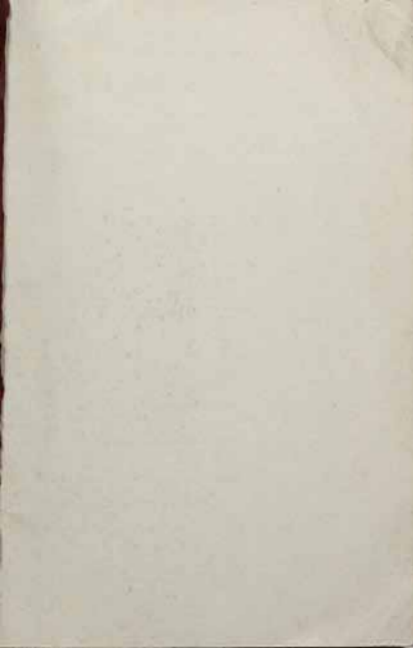
OFFICIAL ORGAN OF THE FRATERNITY

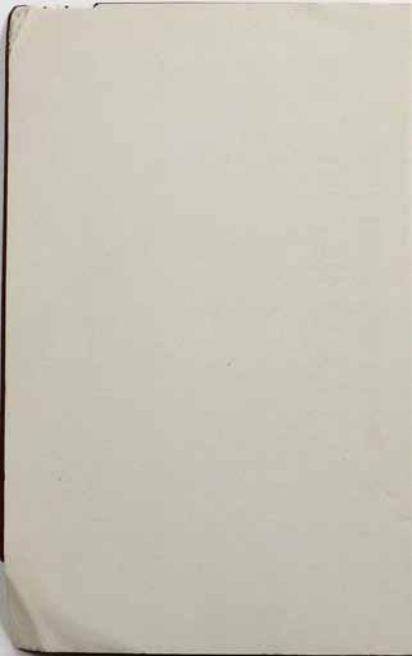


SEVENTH DIRECTORY NUMBER

1917-1918







THE GEAR OF THETA TAU

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E. J. SCHRAEDER
Grand Regent



Your Flag and My Flag

By WILBUR D. NESBIT

Your flag and my flag,
And how it flies to-day
In your land and my land
And half a world away!
Rose-red and blood-red
The stripes forever gleam;
Snow-white and soul-white—
The good forefathers' dream;
Sky-blue and true blue, with stars to gleam aright—
The gloried guidon of the day, a shelter through the
night.

From the Poem "Your Flag and My Flag"
Published and copyrighted 1916, F. F. Volland Company.

Theta Tau Fraternity

Founded at University of Minnesota
October 15, 1904

FOUNDERS

Erich J. Schrader	Edwin L. Vinal
W. Murray Lewis	Isaac B. Hanks

GRAND OFFICERS OF THETA TAU 1916-1917

<i>Grand Regent</i> —Erich J. Schrader '05 Rockland via Yerington, Nev.	ALPHA
<i>Grand V. Regent</i> —M. W. Vickery '11 1028 Engineers Bldg., Cleveland, O.	DELTA
<i>Grand Scribe</i> —H. H. Hopkins, Jr., '08 111 West Lake St., Chicago, Ill.	BETA
<i>Grand Treasurer</i> —B. B. Walling '09 Bankers Trust and Savings Bank, Minneapolis, Minn.	ALPHA
<i>Asst. Grand Treas.</i> —Phil J. Laurence '11 624 Plymouth Bldg., Minneapolis, Minn.	ALPHA
<i>Grand Marshall</i> —H. A. Rice '07 1304 Ohio St., Lawrence, Kansas	ZETA
<i>Grand Historian</i> —Otto C. Budde '12 1579 Compton Road, Cleveland Heights, Cleveland, Ohio	DELTA
<i>Grand Outer Guard</i> —E. F. Davis '10 Bacon Hall, University of California	EPSILON
<i>Grand Inner Guard</i> —E. I. Parker '12 General Electric Co., Schenectady, N. Y.	ZETA

The Gear

The Annual Publication of

THETA TAU

A Professional Engineering Fraternity

OTTO C. BUDDE, B. S., '12 *Managing Editor*
1579 Compton Road, Cleveland Heights
Cleveland, Ohio

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HUGH A. SMITH '18	ALPHA
DELOS I. DOBSON '17	BETA
HARRY E. BOOT '17	GAMMA
DUANE E. KENNEDY '19	DELTA
CHARLES R. KNOX '17	EPSILON
GEORGE H. YEOKUM '17	ZETA
J. SIDNEY MARINE '17	ETA
JOHN PARK '17	THETA
E. ROSS HOUSEHOLDER '18	IOTA
HAROLD P. OWEN '18	KAPPA

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of Theta Tau.

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THETA TAU FRATERNITY

Chapter and Alumni Association Directory

ALPHA—Established October 15, 1904.

University of Minnesota, Minneapolis, Minn.
Address Theta Tau House, 1717 4th St. S. E.

BETA—Established March 26, 1906

Michigan College of Mines, Houghton, Mich.
Address Theta Tau House, Houghton, Mich.
233 College Ave.

GAMMA—Established November 8, 1907

Colorado School of Mines, Golden, Colo.
Address Theta Tau Fraternity.

DELTA—Established May 23, 1911

Case School of Applied Science, Cleveland, O.
Address Theta Tau House, 11439 Mayfield Road.

EPSILON—Established May 4, 1911

University of California, Berkeley, Calif.
Address Mining Bldg., Univ. of California

ZETA—Established April 17, 1912

University of Kansas, Lawrence, Kansas
Address Theta Tau House, 1345 Vermont Ave.

ETA—Established March 23, 1912

Massachusetts Institute of Tech., Boston, Mass.
Address J. S. Marine, 306 Commonwealth Ave., Boston, Mass.

THETA—Established May 7, 1914

Columbia University, New York City, N. Y.
Address John Park, 558 W. 113th St., New York City

IOTA—Established February 5, 1916
Missouri School of Mines, Rolla, Mo.
Address E. Ross Hausholder, Box 302, Rolla, Mo.

KAPPA—Established March 25, 1916
University of Illinois, Champaign, Ill.
Address Theta Tau Fraternity.

Chicago Alumni Association—Established 1910
Chicago, Ill.

Cleveland Alumni Association—Established 1913
Cleveland, Ohio

South Western Alumni Association—Established 1908
Douglas, Arizona.

Twin City Alumni Association—Established 1912
Minneapolis, Minn.

ALPHA CHAPTER

Total number of initiates.....	161
Active members 1916-1917.....	23
Members initiated 1916-1917.....	10

CHAPTER ROLL

Anderson, Edward L.	'17
Beinhorn, Paul	'19
Bros, Ernest T.	'17
<i>Calhoun, Robert</i>	'19
<i>Comstock, Elting H.</i>	Hon.
Craig, D. Stewart	'18
Dennis, Richard C.	'17
Dopp, James L.	'17
Ek, G. Albion	'17
<i>Eliassen, Sigurd</i>	'18
Frank, Harry	'18
<i>Gerow, Theron G.</i>	'18
Hagerman, Oliver S.	'18
Holman, Prof. William F.	Hon.
Hubbard, William E.	'17
Johnson, Ralph E.	'17
Lagerquist, Carl	'19
Luplow, Walter D.	'17
McGivra, Donald B.	'18
<i>Miller, George W.</i>	'18
Northey, Melvin T.	'18
Randall, Larcom	'18
Ritchie, John R.	'17
Robbers, J. Clifford	'19
<i>Rounds, Charles K.</i>	'19
<i>Russel, John A.</i>	'18
<i>Siekinen, Charles A.</i>	'18
<i>Smith, Donald C.</i>	'18
<i>Smith, Hugh A.</i>	'18
Stone, Charles W.	'17
Sullivan, Daniel C.	'19
Tryon, Philip D.	'17
Wallace, Carlton S.	'17
Zelner, Prof. Otto S.	Hon.

N. B.—All members initiated during the year 1916-1917 are set in *italics*.



ALPHA CHAPTER

Anderson	Russell	Belinborn	Craig	Laplow	Northey
Dennis	Calhoun	H. Smith	D. Smith	Randall	Frank
Ek	Stone	Hewett	Prof. Zeiner	Johnston	Hubbard

ALPHA CHAPTER

By Hugh A. Smith, Associate Editor



HE fall of 1916 found seventeen Brothers of Alpha Chapter in school, and upon these members, together with two pledges, fell the burden of "getting started." We moved into a different house, one which suited the purpose somewhat better than did the one occupied

last year.

The first Chapter meeting was called by Brother Johnston, and it was decided to have a smoker. As a result, six members were initiated and became duly enrolled members of Theta Tau on November 9. This class of six was composed of Brothers Robert Calhoun '19, of Minneapolis; Donald C. Smith '18, of Mankato, Minnesota; J. Arthur Russell '18, of Minneapolis; George W. Miller '18, of St. Paul; Thereon G. Gerow '18, of Minneapolis, and Hugh A. Smith '18, of Red Wing, Minnesota.

About this time it was announced by the social committee, composed of Brother Ek (also chairman), that we were to have a dance over at the Calhoun Theatre on December 15. We were all there, Dr. and Mrs. Holman acting as chaperones, and it is needless to say that it was a very enjoyable affair. It is hoped that several more of these dances can be held this year, as it draws the men together in a way which cannot but be beneficial to the fraternal spirit.

It is with the greatest pleasure that Alpha can announce the initiation into Theta Tau, as an honorary member, of Prof. Elting H. Comstock of the Minnesota School of Mines. Brother Comstock was born in Milwaukee June 26, 1876, and took his undergraduate work at the U. of Wisconsin, from which institution he graduated in 1897 as Bachelor of Science. Continuing his studies he took postgraduate work at the University of Chicago, Cornell University, University of Wisconsin and

the University of Minnesota, taking a Master of Science degree at the last school named. At present he is Professor of Mine, Plant and Mechanics at the Minnesota School of Mines, besides being chairman of the Student Work and Enrollment Committee. In this latter capacity he has won an enviable position in the esteem of all "Miners"; he is not only a bang-up educator, he is more. He is a real fellow. It is indeed with genuine gladness that we welcome him into our ranks.

At present we have three pledges whom we expect to initiate in the spring. They are Melvin T. Northey '18, of Hibbing, Minnesota, and two sophomores, Paul Beinhorn, of St. Paul, and J. Clifford Robbers, of Sauk Rapids, Minnesota.

For some reason or other it appears to be a difficult problem to have the Brothers stay at the house. The ruling is still in force requiring each active man to pay for twelve meals a month, and the advantages of such a ruling are quite noticeable. However, many of the Brothers have signified their intention of staying at the house next year, and we are now determined to have them carry out their intentions and so have a "real bunch" at the house the coming school year.

Alpha is well represented in the various branches of college activities. There are four Brothers active in Tau Beta Pi, the Honorary scholastic Engineering fraternity, one president of the A. S. M. E., two on the champion Intra-mural football team, two in the Engineering council, one the Engineering representative on the Athletic Board, two are on the track team, two are on commencement week committees, two are members and actively connected with the Scabbard and Blade, an honorary military organization; one is a member of the Crack Squad, one is president of the Junior class, one is treasurer, one is on the champion intra-mural hockey team and actively connected with the Minnehaha publication, one is a member of the Players' Dramatic Club, two are officers in the

University Corps of Cadets and members of the University Rifle Team, one of whom is the president; one is in the Cosmopolitan Club of the University, and one is a Grey Friar and member of the Sigma Delta, the honorary engineering fraternity.

Three more men were initiated into Alpha Chapter of Theta Tau on the evening of March 1. These three were Brothers Charles A. Siekinen of Duluth, Minnesota; Sigurd Eliasson of Kristiana, Norway, and Charles K. Rounds of St. Paul, Minnesota.

It is not possible to state just how many Brothers Alpha will lose by graduation. However, we do know that Brothers Ritchie and Ek will receive their M. E.'s and Brother Johnston his C. E., so we will necessarily have to lose these Brothers.

With the most of a school semester before us, we feel certain that this is one of the most prosperous years of all for Alpha Chapter and sincerely hope that the same can be said of each Sister Chapter. In closing, Alpha extends her heartiest greetings and the wish of good-fellowship to all the Brothers, and should any Brother find himself in Minneapolis, do not hesitate to come over to the Theta Tau House, and we will do our utmost to make you feel at home.

BETA CHAPTER

Total number of initiates.....	167
Active members 1916-1917.....	23
Members initiated 1916-1917.....	8

CHAPTER ROLL

(See N. B. Alpha)

Aldrich, Harry S.	'17
Bemis, Edwin L.	'18
Brown, Landon N.	'17
Campredon, Philip A.	'18
Dobson, Delos I.	'17
<i>Dyer, Allison C.</i>	'19
Griffin, Roy J.	'17
Harrington, John M.	'17
<i>Henderson, Enoch S.</i>	Hon.
Idema, Robert D.	'18
Kendall, Arthur	'17
Lorain, Sinclair H.	'17
McNaughton, Clark H.	'18
Mitchell, Frederick R.	'17
Moon, Ralph M.	'18
<i>Peterson, Carl W.</i>	'19
Remington, Clyde A.	'18
Schemmel, Julius P.	'17
Suverkrop, Lew A.	'18
Teets, Charles W.	'17
<i>Thielmann, Thomas C.</i>	'18
<i>Weed, Stanley V.</i>	'19
<i>Wood, Alton F.</i>	'19
<i>Wood, Luther E.</i>	'19
<i>Woodlief, Harold E.</i>	'19

BETA'S LETTER

By D. J. Dolson, Associate Editor



BETA comes forth from her winter hibernation long enough to see that the snow is still hiding the fences and other familiar objects of the summer months, or shall we say month, and to extend most hearty fraternal greetings to all the Brothers and Chapters of Theta Tau.

After having tightened all the bolts and screws upon the fraternity typewriter, and having assured ourselves for the 'steenth time that none of the letters are missing, we must confess a longing for a good old-fashioned pen to take in hand, and chew upon. For while Webster included all the necessary parts in his unabridged, he neglected to indicate the method of assembling, and Kent and Kidder furnish no information which will aid us in "dis-stress." We beg the brothers pardon for two reasons: firstly, for saying so little; secondly, for saying so much.

Though we have intimated a long sleep for Beta during the months we are snow-bound, we are not to be taken literally. On the contrary, our involuntary internment is productive of studious habits, and conscientious application. The seniors especially are taking Cap Sperr's reading assignments seriously this winter, and may be found shamefacedly perusing the doings of the Institute in 1897, and other yellowed volumes.

Last winter Beta gave an informal smoker to the members of the faculty and some of the prominent men of the copper country. The idea was very good, and advanced the standing of the fraternity in the community. At the present time we are preparing for another along the same line, and hope it may be made an annual affair. This year Mr. Benedict of Lake Linden will speak upon the leaching plant, and the experiments of the C. & H. with flotation. Brother Nic. Henderson, Supt. of Frank-



BETA CHAPTER

Schimmel	Teets	Campbell	Kendall	Dyer	Silvercup	Harrington	Goffin	Deban
Bennis	Lorain	Peterson	Thielman	Woodlief	McNaughton	Idema	Fernington	Brown
Aldrich	Koepel		Moon	Henderson	Mitchell			

BETA CHAPTER HOUSE



lin, Jr., has also promised to speak upon mining methods.

In spite of the small size of the class of '17, a number of "left overs" and specials swelled the R-3 class to a respectable size, and with two days' accumulation of hematite they might easily have been mistaken for any class of the last four years.

The surveying this year was done at the Princeton, about two miles from Gwinn. The skip made two trips a day, and was big enough to hold one transit. After a few trips down this wet vertical shaft, the boys concluded that Quincy Hill is absolutely nothing.

This year's R-3 class also claims the distinction of being the first to carry on extensive underground hydrographic surveys. A wind-storm blew down the power line and the pump stopped. Whereupon the boys lengthened out their tripod legs, took off their oilskins and waded in. After that the rest of the Iron Country seemed dry, that is, all but Hurley.

The three weeks of sketching were spent in Ironwood, Palatka, and Crystal Falls, at the end of which time the class had absorbed some knowledge of mining methods, dikes, and Kimberly skips, and most important of all a complete directory of the feminine population of these towns, and a good working knowledge of midnight navigation.

Brother W. J. Perkins extended an invitation to the "H & T's" to a dance given by Mrs. Perkins at Alpha, Mich. The bunch resurrected one clean white collar apiece, boarded an alleged automobile and in due time arrived at Alpha for the best evening of the trip.

The class returned to Houghton on the following day, leaving behind a record second to that of no preceding class.

One of the important events of the year, and indeed of the history of the school, was the establishing of the G. A. Koenig Memorial Fund. We are proud that two Theta Tau men, Brother Al Houle and Brother Ocha Potter,

were greatly instrumental in putting the movement upon a sound basis.

Of course, the great event of the school year was the reunion on August 7, 8, and 9. Many of the old guard whose faces were familiar from long intimacy with the chapter group-pictures of former years, and whose names have been preserved in the stories and legends of the school, returned for one rip-roaring week of hilarious fellowship. And the active chapter was loath to be outdone in either the ripping or the roaring.

"Cap" was able to flunk several men in Q-1 this year, though the H & T's came through with flying colors. As usual, much work was done the first month, less the next, and with the beginning of railroading the pseudo "yellow-legs" were capable of working the gun and taking notes by formula.

The opening of school this fall found us sadly depleted in numbers. However, a large freshman class, containing good material, gave us a new lease on life. By hard work the rush committee succeeded in pledging eight new men. Of these, seven were initiated in the fall, and at the present time we have three pledges. The initiation of these men the first part of next month will bring our membership up to 25.

The night following the fall initiation Mr. Enoch Henderson was initiated to honorary membership. Brother Henderson graduated from M. C. M. in 1906 and took degrees of B. S., E. M., and is at the present time Superintendent of the Franklin Jr. We are proud to have him affiliated with us as an honorary member.

There were two changes in the instruction staff at the school this year. Mr. Liston replaced Mr. Bell as physical director, and Mr. Cunningham took over the courses of Mr. Chapman when the latter resigned to accept the position of Professor of Metallurgy at U. of New Mexico. Mr. Sweet, of '16, took charge of the courses previously taught by Mr. Cunningham.

The Fraternity-Independent question which caused a good deal of ill feeling in school last year has been notably missing this year. We supported an independent for student president, and succeeded in obtaining the 2nd vice-presidency and two committee chairmen.

Our large furnace was out of commission during a few weeks in December, and the house was decidedly uncomfortable throughout its moment of inertia. It was indeed fortunate that no real cold weather came upon us, or it might have been necessary to close the house until the necessary parts arrived from Milwaukee. You may infer it was "beery" bad business.

But little time remains of the winter term, and this year's crop of would-be's is looking forward with pleasure to the end of M-4. The R-3 trip is beginning to attract attention, as is also the Y-6 trip, the latter now occurs simultaneously with the trip in underground surveying.

And now may we retire to our winter quarters. Brothers and Chapters of Theta Tau, here's to you.

GAMMA CHAPTER

Total number of initiates.....	110
Active members 1916-1917.....	22
Members initiated 1916-1917.....	13

CHAPTER ROLL

(See N. B. Alpha)

<i>Andrews, Thuddeus H.</i>	'17
Boot, Harry E.	'17
<i>Buckley, Howard G.</i>	'18
Cheney, George	'17
<i>Ehnbam, Lincoln</i>	'17
<i>Gibson, Robert W.</i>	'18
Heitzman, Mearl G.	'17
Higgins, Robert	'17
Hofus, Max T.	'17
Knepper, Chester M.	'17
Munn, Harold E.	'17
<i>Oliveros, R. P.</i>	'17
<i>O'Malley, John J.</i>	'18
Putnam, W. F.	'17
<i>Robertson, Fitch</i>	'18
Robinson, H. A.	'17
<i>Schneider, Henry G.</i>	'18
<i>Tongue, Walter B., Jr.</i>	'18
<i>Williams, William H.</i>	'18
<i>Winchell, John H., Jr.</i>	'17
Worth, Lee K.	'17
<i>Young, Guy K.</i>	'18

THETA TAU MEMBERS ON THE MEXICAN
BORDER

ALPHA

- H. Matchett '14, 1st Sergeant, Batt. A., 1st Minn.
Field Artill.
- F. Rockwood '15, 1st Lieutenant, Batt. A., 1st Minn.
Field Artill.
- H. Quinlan '14, Batt. B., 1st Minn. Field Artill.

BETA

- R. A. Loveland '14, 1st Lieutenant, Co. A., Mich.
Engr., N. G.
- J. F. Holmes '18, Supply Sergeant, Co. A., Mich.
Engr., N. G.
- B. E. Heine '16, Sergeant, Co. A., Mich. Engr., N. G.

DELTA

- H. D. Churchill '15, 2nd Lieutenant, Co. B, Ohio
Engr., 11th Div.
- D. F. Pancoast '17, 1st Sergeant, Co. B, Ohio Engr.,
11th Div.

ZETA

- Sam Fairchild '14, Capt., Headquarters Co., Third
Regt. Inf., Kansas State Militia.
- D. S. James '16, 2nd Lieutenant, Supply Co., Third
Regt., Kansas State Militia.

ETA

- R. E. Wells, Jr., '14, Utah Militia.

DELTA CHAPTER

Total number of initiates.....	87
Active members 1916-1917.....	30
Members initiated 1916-1917.....	11

CHAPTER ROLL

(See N. B. Alpha)

Atwood, Charles R.	'18
Buell, Edward J.	'17
Carlson, Everett A.	'20
Cobbledick, Stanley E.	'18
Craun, John M.	'17
Cutter, Paul F.	'18
David, Carl E.	'17
Diemer, Alan J.	'18
Dugan, William	'20
Freeman, Harley L.	'17
Ganzemueller, Carl H.	'17
Griggs, Elbert C.	'20
Groselle, John F.	'17
Haserodt, Herbert G.	'18
Helwick, Theodore W.	'20
Herbig, Rudolph O.	'19
Hoffman, Walter R.	'18
Holzhauer, William	'18
Hunscher, Homer L.	'19
Jeffries, Prof. Zay	Hon.
Jenks, Karl E.	'19
Kaiser, Haword W.	'17
Kennedy, Duane E.	'19
Kodet, Gustaf	'18
Krill, Leonard H.	'18
Lieber, George M.	'19
Liebing, William	'17
Mix, Robert C.	'18
Pancoast, Donald F.	'18
Sprowl, Norman E.	'17
Stenberg, Walter M.	'20
Stevens, Nathan H.	'19
Thornton, Peter J.	'19
Udy, Gordon N.	'20
Walton, Allyn K.	'19
Ward, Howard E.	'19
Willson, Thomas R.	'18



DELTA CHAPTER

N. H. Stevens W. K. Duggan E. C. Griggs A. K. Walton
 C. E. Atwood H. O. Herbig G. M. Lacher E. A. Carlson K. E. Jenke Wm. Heibauer
 L. H. Kell W. R. Hoffman H. L. Hunscher G. N. Utley T. W. Malwick H. E. Ward D. E. Kennedy
 H. L. Freeman H. W. Kasey N. E. Brown T. R. Wilson R. C. Mies E. J. Beall J. F. Grinstead C. E. David

DELTA CHAPTER

By Duane E. Kennedy, Associate Editor



HAT has Delta Chapter done during the past year? Let us look back for a short time upon the Chapter's activities since the last issue of the Gear. Nine men have been initiated: Walton, Ward, and Thornton last June; Lieber, Herbig, and Jenks at the beginning of the present school year, and Helwick, Griggs, Udy, Carlson, and Dugan only a few days ago. We are extremely fortunate in securing so many new men, who have already stimulated the Chapter to greater activity. The Chapter roll has been increased materially also, since we lost no men by graduation last spring. This year, however, we have nine seniors, which is the largest representation in our history. We also have a new faculty member in Theodore Harvey Barrett of the Mining Department. He comes to us from Theta Chapter, and here he is fast becoming popular among the students. We are glad of the fact that we have Brother Barrett with us, for we expect considerable from him in the line of fraternity activity.

At Case, the fraternities have keen competition in scholarship, the standing being determined by the percentage of "Ds" or failures throughout a semester. It was our fortune to be able to win the cup presented to the fraternity having the highest standing, for the second semester of last year. Theta Tau is also well represented in Tau Beta Pi. Buell, Mix, Craun, Liebing, Granzmueller, and David are now members of this organization, and Krill has been pledged recently. This is a fair showing when we consider the fact that there are a few more than twenty men belonging to the organization at Case.

A number of our men are members of various other organizations at school. Sprowl is a member of Eta Kappa Nu, the electrical honorary fraternity. Kaiser is vice-president of the Case Club Board of Managers, Krill

is a member of the Case Senate, and also News Editor of the Case "Tech." Lieber and Willson are mainstays of the Case Band, while Krill, Willson, and Buell belong to the Glee Club. David, Cutter, Holzhauser, Kodet, Willson, and Ward are members of the Pick and Shovel Club, while Sprowl, Atwood, Lieber, Walton, and Herbig belong to the Electrical Club. The Mechanical Club has Buell, Craun, Freeman, Groselle, Haserodt, Hoffman, Liebing and Kaiser as members, while the Stadia Club claims Ganzenmueller and Mix.

In the past our men have been rather lax in athletic activities, but we are now hoping for better results along this line. Diemer and Mix were both on the football squad last fall, but unfortunately Diemer broke his ankle early in the season and has been obliged to leave school until next year. In basketball, although we had no men on the varsity, we were fairly well represented in the fraternity league and even though the team did not win honors, such a vast improvement was noted that we are hopeful concerning the future.

The social program of Delta Chapter has been somewhat varied this year. Dances were held at the Roadside Club on October 27, and on January 26, and we expect to have another within a few weeks. In the fall a plan was formed whereby we could have fraternity suppers attended by all actives, alumni and pledges. To date we have had two of these informal gatherings which have been decided successes. After the last of these, we were treated to an illustrated lecture by Brother David. He described his trip to Alaska and the gold mines of that region in particular. It is probable that we shall have more talks of this character if such a thing is possible. Then again, on March 10, our annual fraternity banquet will take place at the Colonial Hotel. Arrangements have already been made, and now it is only a question of participating therein.

Brother Pancoast, who would have been a senior this

year, is with the Ohio Engineers on the border. He is now a First Sergeant in Company "B." From his letters, we should judge that the life is rather monotonous. The same things happen every day, and the soldiers have had little excitement. We are glad to hear that the troops will be back soon, for we are getting anxious to see what military life has done for "D. F." Harry Churchill '15 is also on the border. Recently we heard the good news that he had attained the rank of Second Lieutenant.

The Chapter here still has the same house which it had during the convention last year. On account of the growth of the Chapter and greater prosperity we decided to find better quarters, but it has been a difficult matter to obtain what we desire. We have not given up, however, but are constantly watching and waiting for the fraternity house of our imagination. Although our alumni are rather scattered and Brothers of the other Chapters are seldom in the city, we occasionally have a visitor. If you or any of the Brothers of your Chapter are ever in this part of the country, don't forget that Delta will be glad to see you and will try to make your visit enjoyable.

EPSILON CHAPTER

Total number of initiates.....	101
Active members 1916-1917.....	26
Members initiated 1916-1917.....	9

CHAPTER ROLL

(See N. B. Alpha)

Adair, Samuel	'15
Buwalda, John P. (Instructor)	'12
Clark, Clifton W.	'13
Coffey, George W.	'17
Davis, Elmer F. (Instructor)	'11
Deane, Jos. T.	'18
Denbo, John M.	'17
D'Evelyn, Wright E.	'17
Edwards, Merwin G.	'12
Embury, Philip A.	'18
Hudson, Frank S.	'10
Kew, William S. W.	'12
Knox, Charles R.	'17
Lane, Travis P.	'16
May, Art R.	'17
Moody, Clarence L.	'14
Morse, Roy R.	'12
Ogilvie, Samuel J.	'17
Schilling, Karl H.	'17
Starbird, Roy	'17
Stock, Chester	'14
Taliaferro, Nicholas L.	'13
Tupper, Otis M., Jr.	'16
Uren, Lester C. (Instructor)	'11
Vaughn, Francis E.	'12
Wright, Whitney B.	'17



ΕPSILON CHAPTER

Stoek	Wright	Dexter	Hassard	1 st Loderbach	Jane
Schilling	Hudson	Hudson	Denjo	2 nd Kreson	Kuhner
	Talferro		Kronle	Bovalla	Ogilvie

EPSILON CHAPTER

Charles R. Knox, Associate Editor



HE activities of Epsilon for the college year of 1915-1916 were brought to a close with a banquet and meeting held at Kessler's Cafe in San Francisco on May 6, 1916. The outgoing members gave a few words to the Chapter before parting and short talks were also given by Brothers Cole, Kew, and Buwalda. Shortly before college closed Prof. and Mrs. Hersam entertained the members of the Chapter and their friends at a tea and reception at their home.

During the summer most of the Brothers were out after practical experience in the mining camps of California or Nevada, but August found them all back on the campus ready for another year's work. Brother Louderback, who is a member of the Epsilon Chapter, and who, with Brothers Eaton, Hudson, Taliaferro, and Morse had spent two years in China doing some oil geology for The Standard Oil Company, also returned during the summer; Louderback and Eaton to take their place among the faculty of the Geology Department and Brothers Hudson, Morse and Taliaferro for graduate work.

At a meeting on September 20, 1916, Brother Clark gave a report on some geological research which he had been carrying on in Nevada during the summer and Brother Moody spoke on the geology of the John Day Region.

On November 10, 1916, at a meeting held at the Zeta Psi House the following men were initiated into Theta Tau: Merwin Guy Edwards '12, Francis Edward Vaughn '12, Chester Stock '14, Otis Mitchell Tupper '16, Whitney Braymer Wright '17, John Marshall Denbo '17, Joseph Tenison Deane '18, Philip Albert Embury '18, Travis Pollard Lane '16.

Brother Edwards is a graduate of Case School of Ap-

plied Science and at present has charge of the Department of Minerology while Prof. Eakle is absent on his sabbatical leave. After the initiation a banquet was held at the Hof Brau in Oakland and the new Brothers were called upon to give their First impressions of the fraternity. Prof. Hersam also favored the neophytes with some words of advice.

On December 6, 1916, Grand Regent Schrader visited the Chapter and spoke to us on the history and aims of the fraternity.

Epsilon has been well represented on the campus this year, both in athletics and in college activities. Brother Adair, who was captain of the baseball team last year, but was forced to leave College on account of a broken leg, is back with us. He was again honored by the team in being elected captain for the second time. Brother Starbird is also on the baseball team and Brother Lane was a member of the Varsity Football Team. Brother Phil Embury has also starred throughout the season on the basketball team and was just elected captain of next year's Varsity Team.

In scholarships also the men of Epsilon are conspicuous, Brothers Hoenigman, Clark, Farnlacher, and Moody in 1916, Starbird and Coffee in 1917 being elected to membership in Sigma Xi. Brother Butterworth was also elected to Beta Kappa Alpha. Among the men of Epsilon who are members of Tau Beta Pi we find the following: Brothers Starbird, Ogilvie, May, and Coffee.

In Golden Bear, a senior honor society, Epsilon is represented by Brothers Lane and Adair, who are also members of Skull and Keys, and Brothers Adair and Knox are members of Beta Beta, a senior society. Brother Coffee has just been elected to Phi Beta Kappa.

Among the recent University publications is a report by Dr. John P. Buwalda entitled, "New Mammalian Faunas from Miocene Sediments Near Tehachapi Pass in the Southern Sierra Nevada." Dr. Buwalda is a mem-

ber of the faculty of the Geography Department. Brother Bill Kew is again in college this year doing research and graduate work.

Prof. Louderback was the principal speaker at a University Meeting held during the first semester. He spoke on the geology and occurrence of oil in China. He also spoke to the members of Sigma Xi.

Among the new members of the faculty of the University is Prof. Frank H. Probert, who is a graduate of the Royal School of Mines. Until the present year he has been engaged in consulting work, especially on the "disseminated porphyries of Arizona."

As the time for Convention approaches the Brothers of Epsilon look with regret to the great distance which isolates the Western Chapters from those of the East and Middle West and though we cannot all be there in person, rest assured that we will be there in spirit and that we wish the members and chapters of Theta Tau a most prosperous and happy future.

Private Secretary of Governor of Nevada to Head Industrial Insurance Commission.

George D. Smith, Epsilon '11, private secretary to Governor Boyle, was today appointed Commissioner Chairman of the Nevada Industrial Insurance Commission. The appointment is effective April 20 when Smith will enter on his new duties.

The appointment of Smith was made by Governor Boyle, Attorney General Thatcher and State Mine Inspector Andy Stinson.

ZETA CHAPTER

Total number of initiates.....	90
Active members 1916-1917.....	28
Members initiated 1916-1917.....	8

CHAPTER ROLL

(See N. B. Alpha)

Ackers, Deane E.	'17
Bell, Arnold A.	'18
Buckhannan, Joseph P.	'17
Burton, Willard A.	'17
Cooley, Samuel J.	'18
Crawford, Hugh W.	'18
<i>Davis, J. Clark</i>	'19
Diehl, Paul A.	'18
East, J. C.	'18
Gedney, Kenneth H.	'18
Gibson, Woodman L.	'18
<i>Lansing, Jack C.</i>	'19
Lindsey, Adrian H.	'17
Madden, J. Edgar	'18
<i>Mahan, Joe K.</i>	'19
Orton, James W.	'17
<i>Reid, Theodore C.</i>	'19
Rice, Prof. Herbert A.	Hon.
<i>Ruble, Roland O.</i>	'18
Russell, Harlan A.	'17
Shaad, Prof. George C.	Hon.
Shreve, J. Donald	'18
<i>Shughart, Charles L.</i>	'18
<i>Slade, John P.</i>	'18
Smee, George	'17
Van Houghten, Harold C.	'18
<i>Wagner, Page P.</i>	'18
Wakenhut, Carol J.	'17
Yeokum, George H.	'17
Young, Yessel Y.	'18



ZETA CHAPTER

Burkhaman	Russell	Shughart	Bell	Mahan	Rubio	Lindsay	Wagner	Dochl
Ackers	Stoss	Bald	Prof. Rice	Oxton	Maulden	Crawford	Gilson	Van Houten
Yeabum	Faet	Davis	Greene	Gedney	Wakenhut	Coley	Lanning	Young



ZETA CHAPTER HOUSE

Headquarters for 1317 Covertment, Lawrence, Kansas.

ZETA CHAPTER

By George H. Yeokum, Associate Editor



AFTER getting settled in our new location and giving all the returning brothers the glad hand we found that we would start out the year with nineteen active members and seven pledges. Twelve of this number were living at the house. Reid, Wagner, Slade, and Shughart were initiated Oct. 3rd, and as a result of a smoker soon after, Ruble and Lansing were pledged. Prof. J. O. Jones, honorary member, was pledged and will be initiated March 6th. Ruble was initiated Nov. 21st, and the remaining pledges, Mahan, Lansing and Davis, excluding Gage, were taken in Feb. 20th.

On account of seven men leaving school at the end of the first semester a good lively smoker was given Feb. 1st. Many Freshmen were invited and from this select aggregation, eight men were pledged, six Freshmen and two Sophomores. Three of these men immediately moved into the house, thus putting things on a stronger financial basis.

Although not heading the fraternity list in scholarship we have a standing comparable with most of them and as far as honors go we have every organization on the Hill (meaning in the University) backed off the boards. Bro. Lindsey was captain of the 1916 football team and Bro. Smee is captain of the baseball team. Bros. Lindsey, Burton, Russell, Fast, and Reid are "K" men in football. Bros. Bell and Ruble are reserve "K" men. Bros. Smee, Lindsey, and Russell are baseball "K" men.

Diehl, Crawford, Yeokum and Wagner are Tau Beta Pi men, while Shughart is a pledge.

Smee is President of the Senior Class and Vice President of the Engineering School. Yeokum, Diehl and Wagner are three of the four representatives of the Engineering School on the Men's Student Council. Pledge Gage is

Manager of the Sophomore Hop, one of the three big social functions on the school calendar. Gedney was Cheer Leader the first semester, but has dropped out of school this semester. Van Houten is Circulation Manager of the "Kansas Engineer."

Burton, Diehl, Crawford, Russell, Lindsey, and Snee are members of the Schems, senior honor society; Gedney is an Owl, honor junior society; and Reid and Gage are Black Helmets, Sophomore honor society. Diehl, Wagner, Crawford, Van Houten, and Yeokum are members of Aboku (Athletic Helpers of K. U.) an honor society which has for its purpose the keeping eligible of athletes.

Our social activities are confined mainly to smokers, which we give about four times a year. An engineer hardly has time to play society very much. We are a member of the Professional Fraternity Council, which gives one smoker and two dances each year for its members. These furnish a means of becoming better acquainted among the other men in school. Dinner is served every Sunday evening at the chapter house for all our own members. Our founder day banquet will be held as near the 17th of April as possible.

The professional fraternities belonging to the Council have arranged a baseball schedule and we have a good chance of winning the cup.

Zeta Chapter is looking forward to the end of this year when she will be able to greet the brothers from the far West, North, and East. Preparations are under way already for the coming convention and, although Kansas has a bone dry law, a good time is guaranteed every man in attendance.

A little history of the school will probably be interesting to prospective delegates or visitors. Kansas University, established 1867, is located at Lawrence, Kansas, a town of fifteen thousand, on the Union Pacific and Santa Fe railroads, forty miles west of Kansas City, Missouri.

The University buildings are located on a high hill and the campus and views thus afforded are conceded to be among the most beautiful in this country. The school has an enrollment of over three thousand students. The College of Liberal Arts leads with an enrollment of about eighteen hundred with the Engineering school following next with four hundred and sixty. The schools of Law, Medicine, Graduates, Music, and Education have enrollments varying from one hundred to two hundred each. The Art and Pharmacy schools have thirty and fifty-six respectively. There are eleven main buildings with several smaller ones scattered about the campus.

We are sorry that we cannot entertain our Eastern brothers with a Buffalo hunt as that animal has long since been driven from the prairies of Kansas. There are a few fine specimens in the Museum which we will be glad to show them. It might be well to come armed with a trusty rifle, however, as there are plenty of live Indians around Lawrence.

As the date of the Convention has not been definitely set the program of events has not been arranged. Zeta Chapter is looking forward expectantly, however, and wishing everybody all the luck in the world in the meantime, we hope to greet you in person next December.

Theta Tau House, 1345 Vermont St., Lawrence, Kansas.

ETA CHAPTER

Total number of initiates.....	82
Active member 1916-1917.....	24
Members initiated 1916-1917.....	5

CHAPTER ROLL

(See N. B. Alpha)

<i>Cristal, Philip N.</i>	'17
Davis, Lawrence	'17
Drew, Charles W.	'19
Foster, William C.	'18
Gay, Robert N.	'17
<i>Haviland, T.</i>	'17
Hill, Lucius T.	'17
Iglehart George P.	'17
Kittredge, George D.	'17
Krug, F. Stanley, Jr.	'17
<i>Leonard, Julian</i>	'18
Lowengard, Richard O.	'17
Lunn, J. Aleck	'17
Marine, J. Sidney	'18
McIvor, Carlisle C.	'18
<i>Medding, W. L.</i>	'17
Miller, Arthur M.	'17
Miller, Prof. Edward F.	Hon.
Pryor, Willard L.	'17
Richmond, K. C.	'17
Ross, Ralph H.	'17
<i>Sewall, E. D.</i>	'17
Stribling, Simpson R.	'17
Swan, Le Roy A.	'17



ETA CHAPTER

Davis	Swen	McEwen	Cristal	Haviland
Gay	Strubing	Leopard	Evans	Boon
Phonator	Mathison	Miller	Prine	Kittredge
			Loon	Maddling
				Kerr

ETA CHAPTER



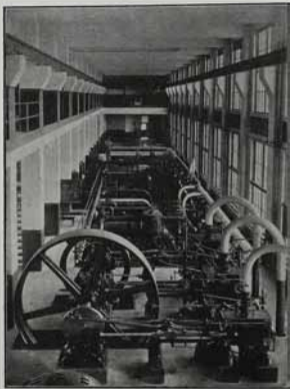
ON returning to College in September, Eta Chapter held her first meeting of the year in the form of a "Rush Smoker" at the Boston Harvard Club. The program was of the usual technical character, supplemented by a very interesting address by our Brother, Prof. E. F. Miller, head of the Department of Mechanical Engineering. (We invited Prof. Miller last June just prior to the great dedicating exercises of our new buildings.)

This smoker resulted in the initiation of the following men: T. Z. Haviland '17, Julian Leonard '18, Philip N. Cristal '17, Edward D. Sewall '17 and Walter L. Medding '17.

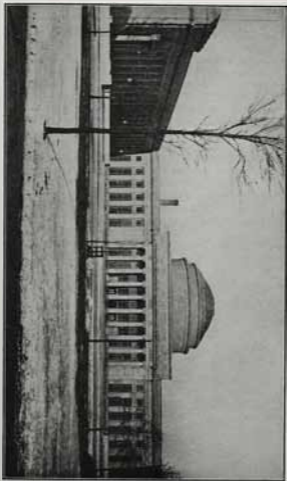
A rush banquet on March 7th, at the Hotel Thosendike, and a final smoker in April, will end our rushing for the year.

Our Chapter this year, though not as large as last, at date of writing, has a very fine bunch of representative Tech. men among them being the President of the Junior Class, Vice-President of the Institute Committee, Chairman Prom Committee, Captain of the Swimming Team and members of Beaver, Masque, Osiris, Vectors, Walker Club, Engineer Corps, Musical Clubs and the various professional societies, as Mechanical Engineer Society, etc. We are also very glad to have Brother Drew of Alpha Chapter with us this year.

At this time a letter from us would hardly be complete without a word or two regarding the "New Technology" in Cambridge. An adequate idea of the size and equipment of these buildings is not possible here and the accompanying photographs hardly do them justice. As an illustration, the big centrifugal pump which you can see in the middle of the steam and hydraulic laboratory picture is capable of pumping 22,000 gallons of water per minute, which it gets from the Charles River, flowing by



MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Steam and Hydraulic Laboratory



MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Looking at the Main Entrance from the "Great Court"

our front door, a quantity sufficient to wash the City of Cambridge Fire Department off the map, and there is other equipment in proportion.

In one respect Theta Tau is unique, in that there is no competing club or fraternity, an advantage in that it gives us, within the eligible courses, a great field of possibilities, but a disadvantage in that it helps to decrease that zest which only competition brings out, and which is so essential for high efficiency in anything.

Scholastically we rank high as compared to the general fraternities and actively we are at the top, because our membership includes non-fraternity as well as fraternity men who are most prominent. Theta Tau, as well as all organizations at Tech., has taken on a "new lease of life" with the building of the "New Technology," its existence is assured, and its future unquestioned.

By J. S. MARINE, Associate Editor.

THETA CHAPTER

Total number of initiates.....	51
Active members 1916-1917.....	19
Members initiated 1916-1917.....	8

CHAPTER ROLL

(See N. B. Alpha)

<i>Abouchar, Sylvian</i>	'17
<i>Armstrong, Clifford</i>	'18
Birkett, Howard	'17
<i>Davis, Thornton</i>	'18
Dixon, Max	'17
Gibson, A. Wallace	'17
<i>Hassan, A.</i>	'18
Kenvin, T. B.	'17
MacMillen, Herbert	'17
<i>Mudd, Seeley</i>	'18
Norris, R. V., Jr.	'17
Park, John	'17
Smith, B. R.	'17
Sommerville, W. B.	'17
<i>Spurny, Emil</i>	'17
Tichborne, Herbert M.	'17
<i>Walker, Harlan A.</i>	'18
Webb, T. H.	'17
<i>Widmer, W. E.</i>	'18

THETA CHAPTER



VERY little has been heard from Theta during the last year, and it is mighty hard to condense all the happenings into one letter. However, here are the most important points.

When Columbia closed last June, the Chapter showed an active membership of eleven men after the brothers who had graduated had been accounted for. Brothers Birkett and Webb were to be with us another year to complete a Thesis and obtain a little additional knowledge.

On the last day of our exams the class started *en masse* for Michigan to make a study of mines. This kept the Chapter together, with the exception of Brothers Gibson, Sommerville, and Walker, for the greater part of the summer. Brother Walker went to Butte for his mine trip and liked it so well that he has stayed ever since.

The summer trip would have been a very pleasant affair but for the fact that we were continually being forced into the mines in an attempt to educate us. There were times when we enjoyed ourselves, however. During the trip we had with us two pledges, Brothers-to-be Spurny and Abouchar. Brother Abouchar is a Belgian, who was forced to come to New York to study as they wouldn't let him into the army. "Abbey" was the shining light of the mine trip. He never seemed happier than when alone in the bottom level without matches and his light out. "Abbey" was also the one who conceived the idea of our swimming in Lake Superior when we were used to the luke-warm water around New York.

Brother Kenvin, who had been in India for a year on a leave of absence, returned to complete his course and was with us on the trip. Brother Kenvin brought with him many of the customs of the Far East, and as he and Brother Abouchar roomed together, there was entertainment throughout the day and night.

The mine trip was composed of visits to the mines in the copper and iron districts of Michigan. In addition we spent some time at the mills and smelters in the vicinity. The whole course required about seven weeks.

College opened in October, a week late, owing to a so-called epidemic of Infantile Paralysis in New York at the time. How it failed to get some of us is still unknown.

An initiation was held for Brothers Spurny and Abouchar on November 2, 1916. At this time it was discovered that "Abbey" had several degrees from European Technical Schools, which accounted for his high marks at Columbia. The initiation was held at the Delta Kappa Epsilon house, which was very kindly loaned to us for the evening, through the efforts of Brothers Gibson and Smith. Although several of our alumni whom we were expecting were unable to attend, it was a very successful affair. The committee on refreshments, under Brother Smith, did especially well.

The Engineering Courses at the University have been put on a different basis during the last few years, so that the time required for a degree is now six years instead of four. Our own class (1917) is the last to come under the old four-year limit. The Mining Course has been slightly changed, the main features being that English and German are included now, whereas we took only strictly engineering subjects. The four-year course has always been considered hard, both as to subjects and the number of hours of class work required. The new one is somewhat easier but still far from a "cinch."

However, six years is a long time to spend in college, especially as the men taking the courses at Columbia are anxious to get through as a rule. This seems to be shown by the dropping off of the number of men taking the various engineering courses. Of course, this may be only temporary, owing to the rearrangement, but at present it looks as if the sub-freshmen were considering six years too long a time to look forward to.

The idea of the University authorities is to give the students a broader knowledge rather than to send out mere engineering "machines." As our class comes under the last head, we are unable to see this argument, but it may be all right.

The war question has come up very strongly at Columbia of late and at a mass meeting, held in the latter part of February, the majority of the student body expressed themselves as willing and anxious to help in case of need. The Chapter has all signed up for Reserve Corps of one kind or another, the most favored one being aviation. The formation of this branch is in charge of Brother Benson '16 who is arranging for a course of instruction to be taken as soon as possible.

In August of last year we heard of the death of Brother Page, Columbia '16, who was killed in an automobile accident. Brother Page was one of Theta's best men while here. He was not only a splendid athlete, playing on both the baseball and the hockey teams, but a brilliant student, having made Tau Beta Pi at Penn State before coming to Columbia.

The standing of the Chapter has been very good during the past year. Brothers Dixon and Abouchar were elected to Sigma Xi, Brother Dixon having also made Tau Beta Pi.

On the Crew we have Brother Tichborne and on the Swimming Team Brothers Gibson and Sommerville. Brother Webb is still playing hockey, having been captain of the team for two years. Although the students of engineering are not eligible for football, we were represented on the senior team by Brothers Birkett, Webb, Gibson, Park, and Tichborne.

The outlook for next year is very promising, six men have been pledged, for whom we are to hold an initiation on March 27. The place of the initiation has not yet been decided on but the committee in charge are looking for a suitable hotel. The men who are pledged are as follows: Thornton Davis '18, Seeley Mudd '18, A. Hassan '18, Harlan A. Walker '18, W. E. Widmer '18, Clifford Armstrong '18.

By JOHN PARK, Associate Editor.

IOTA CHAPTER

Total number of initiates.....	30
Active members 1916-1917.....	18
Members initiated 1916-1917.....	11

CHAPTER ROLL

(See N. B. Alpha)

<i>Ambler, Harry A.</i>	'17
<i>Barton, Joseph C.</i>	'17
<i>Beyer, Daniel C.</i>	'18
<i>Bowels, Martin F.</i>	'17
<i>Cunningham, Lorain H.</i>	'18
<i>Geih, Francis H.</i>	'18
<i>Gill, James P.</i>	'19
<i>Golick, Tony F.</i>	'18
<i>Herivel, Harold T.</i>	'18
<i>Horner, Howard A.</i>	'17
<i>Housholder, E. Ross</i>	'18
<i>Kern, Paul D.</i>	'18
<i>Potts, Allen D.</i>	'19
<i>Reilly, John H. G.</i>	'17
<i>Shriver, Ray O.</i>	'17
<i>Stoner, Oscar E.</i>	'18
<i>Weimer, Earl J.</i>	'17
<i>Weiser, Hanley</i>	'19



IOTA CHAPTER

Sheiver	Herivel	Ambler	Gerb	Homer
	Householder		Barton	
Kern	Reilly	Bowles	Weimer	Stoner
Golik	Cunningham	Weiser	Gill	Potts
	Bayer			

IOTA CHAPTER

By BOSS HOUSHOLDER, Associate Editor.



ORTUNE has smiled on Iota this year. Brothers Bowles, Herivel, Reilly, Barton, Geib, and Housholder returned last fall to start things rolling. Active meetings started the second week of the school year and they have been held regularly every two weeks since then.

The first meetings were held in the quarters of Housholder and Geib. Later the meeting place was changed to the lecture room in Metallurgy building. It is hoped that at the beginning of next year we will have a more private meeting place, which may be used as a club room for the members as well.

After a series of characteristic H and T meetings, the following men were elected to membership in the local chapter and were duly initiated on the evening of November 11, 1916, in the Geology lecture room in Norwood Hall. The men were as follows: R. O. Shriver, Howard A. Horner, Paul D. Kern, and Oscar E. Stoner. After the initiation the old members banqueted the new men at the Baltimore Hotel.

The spring initiation was held Saturday evening, March 31, 1917, in the Geology lecture room in Norwood Hall. The seven men taken in at this time were: Fay E. Weimer, Daniel C. Beyer, Tony Frank Golick, Lorain H. Cunningham, Hanley Weiser, James P. Gill, and Allen D. Potts. After the initiation the new men were banqueted by the older members at the Baltimore Hotel. C. R. Forbes, professor of mining, and H. A. Buehler, chief of the Missouri Geological Survey, were guests of honor at this banquet.

Iota's members have been exceptionally prominent in school activities this year. Brothers Shriver and Cunningham made their letters in football the past season and Brother Beyer was a squad man. Brother Stoner,

as manager of the Athletic Association, did very excellent work during the season. Brother Gill was the hero of the Freshman-Sophomore game in football. Brother Weiser also played in this annual contest.

The baseball season has just opened. Brother Golick received his letter last year and is out again this season, together with a few of the other members.

Brother Barton received his letter in track. Gill is also a track man and we hope to see him placed this season.

Geib is local editor of the Miner, our school weekly.

Bowles was elected president of the Missouri Mining Association, which is the affiliate body of the A. I. M. E. "Spike" Herivel is secretary of the same organization.

A new society was organized this winter known as the Metallurgy Society. Horner is vice-president.

The mining and metallurgy men of Iota all take a prominent part in the activities of these two societies. The following seven men are members of the A. I. M. E.: Brothers Reilly, Barton, Ambler, Horner, Weimer, and Housholder.

Brothers Shriver and Kern are senior and junior representatives respectively on the Student Council, an organization to promote the welfare of the student body.

Our school annual, the Rollamo, promises to equal any former edition of that publication both in appearance and interesting data concerning the school year. Ambler is the business manager, Bowles the advertising manager, Stoner associate editor, and Housholder art editor. Brothers Kern, Geib, and Golick have been elected to serve on next year's Rollamo board.

The school lyceum course thrived this year under the able management of the Y. M. C. A., of which Horner is president.

On the few occasions that the Mandolin Club has appeared it has made a decided hit, possibly due to the able leadership of Brother Ambler.

The Mucker orchestra, which has furnished most of the music for the local school dances, has as its leader "Jack" Horner, who entered this school last year from Penn State.

As an organization Iota has accomplished little in a social way, but individually we have all had our share of the social events afforded in Rolla.

What proved to be the most interesting feature of our meetings this year was the twenty-minute talks by the different members. Each of the old men chose his own topic, dealing with some engineering subject. Most of the talks dealt with conditions as observed by the men while working during the summer vacations. Without exception these talks proved very instructive to the chapter and it helped the individual in teaching him to prepare and deliver a short talk before a group of men. The subjects and men are listed below:

"Copper Smelting at the Calumet and Arizona Co., Douglas, Arizona," by Harry A. Ambler.

"Milling at the Vindicator Gold Mining Co., Independence, Colo.," by Francis H. Geib.

"Mining and Milling Practice at Music, Mt. Camp, Mohave County, Arizona," by E. Ross Housholder.

"Mining Methods of the American Zinc Co., at Mascot, Tenn.," by Joseph C. Barton.

"Smelting at the Rose Lake Smelting Company, East St. Louis," by Martin F. Bowles.

"Review of the American Smelting and Refining Co. Plant at Omaha," by Howard A. Horner.

"Mining Conditions in Joplin," by J. G. Reilly.

"Mexico and Mining," by H. T. Herivel.

Shriver, Stoner, and Kern also gave talks, but their topics were not announced at the time this article was written.

As to scholarship our members are all doing nicely and we are fortunate in having Brothers Ambler and Shriver as members of Tau Beta Pi this year.

We have tried to sum up the happenings at Iota this past year, and in closing we want to extend to our sister chapters our best wishes for success, hoping that any Theta Tau men will pay us a visit should they travel this way.

KAPPA CHAPTER

Total number of initiates.....	46
Active members 1916-1917.....	36
Members initiated 1916-1917.....	23

CHAPTER ROLL

(See N. B. Alpha)

<i>Clark, Charles M.</i>	'17
<i>Darby, Harry E.</i>	'17
<i>Dutton, Herbert B.</i>	'17
<i>Engliak, Frank J.</i>	'18
<i>Flannery, Charles A.</i>	'17
<i>Foulke, Ronald</i>	'18
<i>Frey, H. O.</i>	'18
<i>Gierts, R. E.</i>	'17
<i>Gordon, K. H.</i>	'18
<i>Hayne, Walter E.</i>	'18
<i>Hickey, Dan W., Jr.</i>	'18
<i>Jensen, J. E.</i>	'18
<i>Johnson, Robert E.</i>	'17
<i>Kraft, Renald R.</i>	'18
<i>Kroeschell, Roy</i>	'18
<i>Lund, Jack V.</i>	'17
<i>Machovec, E. P.</i>	'18
<i>McCormack, T. H.</i>	'18
<i>McEvers, Ernest</i>	'18
<i>Miller, Harry W.</i>	'17
<i>Needler, John H.</i>	'17
<i>Newton, Roy K.</i>	'18
<i>Ott, John E.</i>	'17
<i>Owen, Harold P.</i>	'18
<i>Peck, Roy L.</i>	'17
<i>Perry, Robert A.</i>	'18
<i>Petter, Stanley D.</i>	'18
<i>Pursell, James</i>	'18
<i>Reed, M. J.</i>	'17
<i>Reichelderfer, Harry</i>	'18
<i>Ritter, Walter T.</i>	'18
<i>Sheppard, Charles H.</i>	'17
<i>Sprague, Norman E.</i>	'18
<i>Strauch, Dan</i>	'18
<i>Westenhaver, L. J.</i>	'18
<i>Wilson, Wilbur M.</i>	Hon.



KAPPA CHAPTER

C. Flannery W. Haynes H. Beebeboelter R. Foulke R. Kraft R. Kronenbill D. W. Hickey
E. McEvers E. Pettus Z. P. Tuttle E. K. Newman J. E. Ott H. P. Owens C. Clark
A. Gerts J. V. Lund H. Sheppard E. Peck J. Needler H. Markwardt C. Campbell M. Reed

KAPPA CHAPTER

By JACK V. LUND, Associate Editor.



ALTHOUGH Kappa Chapter is the youngest chapter of Theta Tau, we have accomplished much. Because of our youth it is evident that our sister chapters know little or nothing about us; but undoubtedly would like to know how and what we are doing, and what our status in the University of Illinois is; hence a brief outline of our work in the past year, and a note or two on the men who are doing the work.

To start with there are about one hundred and four organizations on our campus, including social, professional and honorary. Some of these societies have been firmly established at this school for years, and consequently from the face of it, one would expect that a chapter starting in as Kappa did would have to content itself with only a few good men for the first few years. It seems only natural that in deciding which of two organizations to pledge oneself to; one that had been established at the University for some years and is much coveted, or one that has just sprung into existence, could end only in favor of the first. We are happy to be the exception to the rule, and can truthfully tell the brothers that even at this time there is no professional or honorary organization on our campus that has fifty per cent as many men of prominence and ability as has Kappa of Theta Tau. Not only that, but it is recognized as the leader of the professional societies. Every man is a representative man of some activity and well known about the University.

Among the school honors held by the brothers are: President Mining Society; four members of Tau Beta Pi; President of Student Union; Captain of varsity football team; President of Junior Class; four members of varsity football team; Student Colonel of Cadet Brigade; two captains of brigade and five lieutenants in brigade;

Catcher and first-baseman on varsity baseball team; four members of Engineers' Day Committee; Member of Engineering dance committee; member Senior Ball committee; three members of Junior Prom committee; Chairman and one other member of Military Ball Committee; Captain of Varsity water basketball team; member Senior Stag Committee; three members of Mawanda, Honorary Senior Society; two members of Sachem, Honorary Junior Society; member Senior smoker committee; several members of various honor societies such as Scabbard and Blade, Pi tau Sigma, etc.

We have adopted a policy of having regular meetings every two weeks where our work can be carried on. These meetings are held at the various fraternity houses about the campus, and consequently furnish excellent rooms in which to hold our gatherings. The work is of course primarily along educational lines, and especially along the lines putting pep into the Engineering College as a whole. As a result of this, Theta Tau is directly responsible for the starting of an annual Engineers' Day, which is to be in the nature of a carnival and gala day by and for the Engineers only. The programme is to start out with a big peppy smoker with plenty of good things to eat, smoke, lots of good talks and music. The following day is devoted to parades, athletic and humorous field events between fraternities, colleges, and individuals, etc., and ending up with a regular engineers' dance. All of the other societies as well as the students at large and the faculty are backing us on this and we feel sure of its success.

Another big movement which we have started, but which as yet is not fully developed, is intercollegiate debates by members of the engineering colleges of various branches. The subjects of these debates are to be of a technical nature, but given in such a way that the judges can be selected from the laymen. It is our opinion that in this way we will not only stir up a little more college

spirit, but we will enable the engineer to present his case in such a way that the layman can grasp his ideas readily.

We are also doing all in our power to bring about a change from the old "Cat Watching a Mouse" stunt to the honor system in examinations. We are ardent believers in a man's greatest possession is his honor, and you can rest assured that if it is possible we will see that the system is installed.

The members taken in the first semester are: Clark, Flannery, Foulke, Hayne, Hickey, Kraft, Kroeschell, Newton, Ott, Owen, Petter and Reichelderfer. Those taken in the second semester are: English, Frey, Gordon, Jensen, McCormack, Machovec, Perry, Purcell, Ritter, Sprague, Strauch, and Westenhaver.

All of these men are workers and men whom we are glad to call brothers in H and T.

At each initiation we have a banquet, which concludes the ceremony. It is a banquet which is to be remembered not as an ordinary affair, but as an extraordinary affair. It lasts for a couple of hours, so as to give ample time for speeches from the various members, plenty to eat, plenty to smoke, and enough jokes, etc., to keep up the spirit. To describe such an affair is asking too much and would only serve to make us discontented with our regular meals.

On the 13th of April Theta Tau holds its first annual dancing party at the Beta Theta Pi house. It will be quite a pleasant affair and we are all looking forward to it with much pleasure. The kindness of the Betas is most sincerely appreciated by the brothers for the use of their chapter house, which was secured for us through Brother Bill Nelson.

In conclusion I shall say that you will always find Kappa Chapter on the job and that our high standard shall be kept up. Should any of the brothers at any time wander into our town, a most hearty welcome will be extended by all of the members of the local chapter.

EDITORIAL

One thing that is uppermost in the mind of every true American is the stand our Government has taken to defend the rights of the American People. Let us who are fitted and qualified as engineers and men of science be ready to respond to the nation's call at this hour of need, with all the true spirit of American manhood.

As you look through the pages of this year's Gear you will see noted several of the brothers who already have devoted themselves to one form or another of the nation's service. Many have been engaged in Border duty for the past months and occupied positions of responsibility in the Corps. of Engineers of the several states. Of those who have been mustered out recently all are again ready to step into whatever duty they are called upon to fill.

Special mention ought to be made here of two of the many Brothers who are at present engaged in the war of the world which has been waged in Europe for the past two years. Brothers Russell of Gamma and Boddle of Epsilon reported from the field of battle somewhere in France. They can be reached through the addresses in the 1917 Gear. Wouldn't it be a little satisfaction to them to know that someone has their welfare at heart, enough to either write or send them a box of cigars, if nothing else?

There are others in the American Ambulance Service that we have not heard from as yet, but who may answer at an early date. We are hoping for their welfare.

You may have noticed a change in the make-up of the directory this year. Only those notes which have been received by the editors in time for publication have been included, all other records were not carried for the reason that there have probably been such changes in the meantime either in position or location that the old items would be out of date. Any changes that are now at your disposal and that should be made in this coming directory ought to be sent the editor right away.

The Editor takes this opportunity of thanking all those who contributed to the make-up of this present issue. The associate editors also responded very readily with all material and information, even though called upon much earlier than heretofore.

We regret very much that it was necessary for our Brother, E. J. Schrader, to spend several months in California, due to several minor operations which we understand have proved beneficial but which were not at all pleasant to undergo. Only such conditions hinder his untiring efforts in behalf of the fraternity, the interest of which is always uppermost in his heart. If you have not been favored by his bountiful supply of correspondence lately you will understand that it was a trial for him to keep from doing it.

To you who have so generously filled out the reports as called for by the editor the success of this present issue is due. If you now would get after those other members whose reports you do not find in the directory and let them see how much they, too, can help by just a few moments' communication with the editor then the task which now confronts him will have disappeared.

The next convention of Theta Tau will be held at Lawrence, Kansas, in the latter part of December. (Probably 28-31.) This will bring the chapters together in one of the western states which not only is growing beyond our expectations but bids fair to outstrip many of the older states. The Brothers at Zeta have already realized the importance of this national assembly and promise a royal welcome to all who can find it possible to attend for all or part of the Convention. Those who are too far from the center of activities to attend in person can contribute by spending a little time with your favorite pen and paper. Let's pull for this convention to be held at Zeta, 1917.

The mutual interest of the brothers in such technical articles as submitted by the members of Theta Tau for higher degrees will, I trust, be an incentive to submit the

subjects for publication together with copies if possible of future articles and so increase the list as found on page 67 of this issue.

During the remainder of this year let each member keep in mind that what will interest the members of any one chapter will be of general interest to the fraternity. Send clippings of such general items to the editor—marriages, cradle roll members, etc. Needless to say that the editor would like to hear what you are doing to serve your country.

In Memoriam

JAMES A. WORLEY, Jr.

As a member of Theta Tau we mourn the death of the second Regent of Iota, James Alexander Worley, Jr. Most of us who knew him realize that we have lost a true friend and brother.

Bro. Worley died October 18th, 1916, after a short attack of pneumonia following a period of ill health, covering several months. He had been at the home of his father in San Antonio, Texas, less than two weeks when the Angel of Death called him.

Bro. Worley was a charter member of Iota. Before entering the Missouri School of Mines he had been a student at the University of Texas where he became a member of Delta Sigma Phi. He was twenty-four years of age at the time of his death.

GEORGE R. PAGE

We mourn the death of Brother George R. Page who was killed in an automobile accident, August, 1916.

He entered Penn State in 1910, graduated from the same institution in 1914. He was prominent in school activities having played end on the varsity foot ball team, a member of the honor fraternity Tau Beta Pi, and a member of Kappa Sigma Fraternity.

He entered Columbia as a student in metallurgy and graduated in that course in 1916.

Brother Page was on the varsity baseball team in 1915 and 1916, played on the varsity hockey team in 1915, he was very popular at Columbia as well as being a splendid athlete and student.



JAMES A. WORLEY, Jr.

CRADLE ROLL MEMBERS
OF THETA TAU

1	Ballard, John Butler		Beta
	Barnum, Mary Adelyn	July 24, 1916	Alpha
2	Cameron, Bradt Wilson	Dec. 15, 1916	Beta
	Carroll, Baby	1917	Beta
	Cramer, Eloora Louise	June 6, 1916	Beta
	DeVey, Nancy Howard	July 19, 1916	Alpha
	Forbes, Katherine	Nov. 1916	Gamma
3	Frishie, Stewart Edwin	Aug. 16, 1916	Delta
4	Gibson, Winslow Curtis	Oct. 25, 1916	Eta
5	Hartley, Donald Tomlins	1916	Delta
6	Hopkins (Boy) H. H., Jr.	March 13, 1917	Beta
	Jerome, Barbara	Nov. 30, 1916	Eta
7	Larkin, Arthur Edward, Jr.	March 7, 1917	Alpha
	Lowell, Deborah	Jan. 1917	Gamma
	Luce, Harvey Hill	Oct. 1915	Beta
	Packard, Mildred Lucy	Nov. 18, 1916	Epsilon
	Perry, Barbara Helen		Alpha
8	Rocca, Berard T., Jr.	Two years	Epsilon
	Smith, Elizabeth Lyon	May 6, 1917	Gamma
9	Van Valkenburg, Robert Ray, Jr.	Oct. 13, 1916	Beta
10	Wheeler, Frank Knowles Blasdell	Four years four months	Alpha
	Smith, Henry Osborne (Deceased)	Apr. 29, 1916	Gamma

PUBLICATIONS BY THETA
TAU MEMBERS

DON C. BILLICK, Epsilon '13

"Manganese in California"

Mining Press, March 10th, 1917

R. R. BRYAN, Gamma '08

"From Precipitate to Bullion"

Mining and Scientific Press, Dec. 16th, 1916

P. M. McHUGH, Gamma '11

"Review of Cyaniding in 1916"

Salt Lake Mining Review, January 15th, 1917

VICTOR ZIEGLER, Gamma

"The Pilot Butte Oil Field, Fremont Co., Wyoming"

Geological Bul. No. 13 of State of Wyoming, 1916

PAPERS

DR. JOHN P. BUWALDER

"New Mammalian Faunas from Miocene Sediments near
Tepachapi Pass in the Southern Sierra Nevada."

ALUMNI NOTES

ALPHA

Brother Kenneth B. Bush '16 is at present assistant to W. P. Bushnell, Drainage Engineer—building levees and ditches, etc., along bottoms of Mississippi and Illinois Rivers.

Brother Leo W. Capser '15 left for Athens, Greece, in November, 1916—was at Liverpool, London, Paris, Marseilles two months.

Brother Isaac Baker Hanks '07 is now the active head of Hanks & Co.

Brother A. S. Hill '11 for the past year has been doing experimental flotation work on ores of the Coeur D'Alene district and at present is in charge of the metallurgical work at the Hecla Mining Co.'s lead-zinc mill near Wallace, Idaho.

Brothers Phil. L. and Paul A. Johnson of Alpha have changed their names to Phil. J. and Paul A. Laurence and have also changed the name of The Johnson Construction Company to The Laurence Construction Company.

Brother Erich J. Schrader '06 was appointed delegate from Nevada to the American Mining Congress by the Governor of Nevada in November, but on account of sickness was unable to attend. After two operations and an illness of four months we are pleased to say that Brother Schrader is much better.

Brother D. S. Helmick '15 is now in Chicago and is connected with the government as a Junior Civil Engineer.

Leo Capser '15 is now in Greece as representative of the Standard Oil Co.

"Elt Houghtaling '16 was a visitor at the Chapter House during the Xmas holidays. "Elt" is now located in Norris, Montana, being connected with the Great Falls Power Co.

"Chuck" Stone '16 finished his post-graduate work last semester, and is now with the Minnesota Manufacturers' Association, St. Paul.

Roy Dunham '15 is still with the General Electric Company, Schenectady.

George Hult '16 calls on the brothers occasionally. George is connected with the construction department of the Northern States Power Company, Minneapolis.

Henry Matchett '14, who was Editor of the 1915 Gear, is at present home from the Mexican border on a short furlough. Henry is 1st Sergeant, Battalion A, 1st Minnesota Field Artillery.

Fletcher Rockwood '15 is expected to return soon from the border. "Fletch" is in the same company as Matchett, and holds down the position of 1st lieutenant.

Howard Quinlan '14 is another brother who is down on the border and is expected to return soon. Howard is a member of the "silk stocking battery," otherwise known as Battery B.

"Maury" Hewett '14 is taking post-graduate work, specializing in hydrology, and assisting Prof. Meyer in some of his work. George Shepherd '09 is in the same department doing special work for Prof. Meyer.

"Rosy" Rufsvold is now in St. Paul with the State Highway Commission.

"Stan" Loeffler '15 is still with the Great Northern Railway, in the office of the bridge engineer, St. Paul.

"Tom" Askew '16 is in St. Paul with the St. Paul Water Board. Brother Askew shows himself at the House occasionally.

"Tom" Leonard '16 is at present in Omaha on construction work for a St. Paul concern. When in St. Paul Brother Leonard stays at the House.

"Yee" Ek, one of Alpha's most recent alumni, who was taking post-graduate work this year, expects to be associated with the Eclipse Ore Reduction Co., Minneapolis.

"Jawn" Ritchie, another brother who finishes his post-graduate work this year, is connected with the Minneapolis Steel Machinery Company, Minneapolis.

BETA

Brother Arthur Potter Allen '15 would like to know what has become of the Beta Class of 1915 "Round Robin Letter."

Brother James A. Barr '07 in addition to his regular work as engineer for The International Agricultural Corporation has been engaged during the winter months in designing and building a three-hundred-ton graphite mill in Alabama, also reporting on mining properties in Alabama and Kentucky.

Brother Walker B. Longan '09 expects to arrive home on a vacation about May 1st this year.

Brother Geo. E. Welker '09 can place some Theta Tau men in Pennsylvania next summer.

Brother B. O. Pickard '06 has been appointed assistant mine-safety engineer, to be in direct charge of mine-rescue work in metal mines. This is under the direction of the U. S. Bureau of Mines.

When last we saw John R. Posa, he expressed his intention of attending Columbia University this year. We presume he has matriculated there; we base our conclusion upon his well-known ability to carry out his plans as they have been laid. And upon the same fragile foundation we are building our hopes that he will come back this spring for the Y-6 trip.

We frequently wonder how things are logging with Chas. J. Rashleigh. When Charley first went west, we were often pleasantly entertained by letters in his open style, but since the old guard have drifted away one by one, we are no longer afforded this pleasure. However, we wish you luck, Brother Rashleigh, and we hope you are still shaking down the loose with that hearty laugh of yours.

Brother W. Arthur Rigby is now with the Feldspar, Ltd., Harrington, R. R. L., Ontario, Canada.

Brother C. P. Shields comes in from Winona quite regularly of a Saturday night. He occupies the berth above us, but we honestly could not hear him if he did snore. However, perhaps you are not as much concerned with that as with where he goes for dinner Sunday.

Brother J. R. Scott called at the house shortly before the Christmas vacation. He is now with Art Rigby at Feldspar, Ltd.

The last letter to Brother C. G. Thielicke, Treadwell, Alaska, was returned.

We have lived to witness that which we believed utterly impossible. A letter to "Col." Wiggins has been returned. We would have sworn upon oath that a letter to the "Col." would reach him though it were necessary to fire-proof it.

[Editor's Note.—Dear Brothers, even the "Col." Wiggins may change his address.]

We had hoped that Merley Foard would return to school this fall, but he decided otherwise and is now at Irontown, Minn.

Brothers Fred Gibbs and Carl Mills are busily laying plans for a bumming trip this summer. At the present time they are very much occupied as engineers at Palmer, Mich., and United Verde respectively.

We have not yet heard of Brother F. V. Hicks' marriage, though many rumors of its possibilities have reached us. Brother Hicks is engineer with the Shattuck Mine, Bisbee, Ariz.

We personally met P. E. Hinckley in Detroit last summer, and he reports everything pleasant along the Rialto, with business picking up. He is selling pumps to Detroit's "Plutes."

Brother King was very agreeably surprised while working as clean-up man at Bisbee in receiving an offer of position of Gen. Mgr. for the Highland Valley Mining & Developing Co., Ashcroft, B. C., though not too greatly surprised to accept. "Babe" has hopes for the future of the mine, and at present is getting some very satisfactory results. All luck to the erstwhile clean-up man and present Gen. Mgr.

We received a very interesting letter from W. B. Langan and local pictures of the district. He is with the N. Y. & Honduras Rosario Co. as mine foreman.

Brother R. A. Loveland has been with the boys at the border, holding the position of lieutenant in Co. A, Calumet Engineers, Michigan National Guard. With him also are Brothers J. F. Holmes and B. E. Heine. We expect that by the time they receive their copy of the "Gear" they will have left the unpleasantness of guarding the border.

John Metcalf called at the house several times last winter. Mr. and Mrs. Metcalf were visiting in Hancock, the former home of Mrs. Metcalf. John is now at the Gilbert Mine, Mesabi District.

Brother Nicolson dropped in at the house for a few days last fall, and was here very opportunely for the fall banquet, at which he officiated with all the old sparkle as toastmaster.

Brother A. P. Allen has left Superior and is now prac-

ting efficiency as learned from the teachings of Brother Potter, at Ashcroft, B. C., where he is underground superintendent for Brother R. B. King.

"Gid" Apell feels that he has gathered enough experience about White Pine, and has left for parts unknown. "Gid" spent a few days at the house before Christmas, during which time we were very busy answering many gentle-voiced inquiries that Mr. Apell was not in.

N. L. Bradt complains from Crysotile, Ariz., of Mexican and Indian helpers. Brother Bradt is engineer for the Arizona Asbestos Co.

We have not heard from A. E. Carlson for some time, though we understand he is engineer with the Shannon Copper Co., Metcalf, Ariz. If any of the brothers pass through Metcalf they must ask Brother Carlson of the "funny little mules" which ate his "Post."

During the course of the year Brother W. F. Carroll's family was augmented by one. We congratulate Brother Carroll.

Late letters to L. A. Chesro have been returned. We last heard from "Ches" from Grand Rapids, Mich.

"Jack" Clarke is gaining some valuable experience upon leaching of tailings at Lake Linden where he is engaged upon the reclamation work of the C. & H. Copper Co. These waste sands assay 22 pounds of copper, and Brother Clarke reports 18 pounds saved.

Mr. and Mrs. C. F. Cramer and "family" are now at home in Toledo, at 625 Federal St. We trust that all is well with the Cramers.

"Joe" David is still developing efficiency at the Isle Royal, Houghton. "Joe" drops in at the house from time to time, and amuses the brothers with his T. A. Rickard delivery.

Brother Al Ferris takes time to drop the boys an occasional line from Metcalf, Ariz. We appreciated his recommendation of some of the men entering school this fall.

"Dick" Fraser had some wild ideas of sailing for India, but has been dissuaded from that step by Brother King and is now Mill Superintendent for the Highland Valley Mining & Development Co. We appreciate the many interesting letters received from "Dick."

GAMMA

Brother Jas. B. Lowell '08 remarks that Worcester has a graduate Chapter of Theta Tau consisting of two members, Henry Hooker Forbes and James B. Lowell, both of Gamma. Meetings are held at least once a week. There are no officers and no dues—wives are always present and usually Katherine Forbes, age five months, and Deborah Lowell, age six weeks. Visiting brothers cordially invited.

Brother Gilmore S. Davis '15 suggests that some Alumnus having an office in cities like Denver, Salt Lake City, San Francisco, Chicago, etc., designate his place as one at which Theta Tau men can get in touch with each other when in that city. As it now is, Brothers in Theta Tau meet only by chance. A small card with such addresses should be in each member's card case.

Brother D. O. Russell '09 for the past two years has been with the Royal Engineers as lieutenant, fighting in France with the British expeditionary forces. The Editor feels complimented to think the Alumni Report sent to Brother Russel during the blockade not only reached him at the front, but that he did stop long enough to fill it out and send it back for the 1917 Gear. It passed the censor all right. How about some of these Alumni in good old U. S. A.?

DELTA

Brother George R. MacInnes '15 has installed a metallographic laboratory at the Shelby Seamless Tube Co., having installed a chemical laboratory a year ago.

Brother Walter Stenberg '19 will return to school next year. ❧

Brother N. D. Abbey has been trying to fill Dad's shoes for a while at the Aetna Machine Co., Toledo, Ohio. ❧

Brother Applegate is in St. Louis as material engineer for the Wagner Electric Mfg. Co. We have heard that Brother Applegate's engagement has been announced. How about it, John?

Brother Badger for some months has been engaged as inspector for the French and Italian Governments. He is located at West Duluth, Minn.

Brother Cotton has touched the right spot with the active members of Delta. Ask them why.

Brother A. H. Kline reports from Franklin, Pa. He now is chief chemist for the Franklin Works of The American Steel Foundries.

Brother Malm has been specializing in acetylene welding. He now is with The Standard Parts Co., Cleveland, Ohio.

Brother O. F. Schramm has again returned to Cleveland after a long absence. He is in the Coke Dept. of The River Furnace Co., Cleveland, O.

Brother Stein reported from Midland, Mich., but not having filled out his report completely we could not say just what he is doing.

Who has heard from Brother M. Roy Strong in the past two years?

Brother Troppman is with The Pittsburg Lamp, Brass & Glass Co., of Pittsburg.

Brother G. E. Alderson somehow or other dropped from Canada to Venezuela, South America. He is asst. gen. manager for a good sized copper company operating mines and smelters.

Brother Churchill, we are informed, has just received his commission as second lieutenant in the Co. B Ohio Engineers on the Border.

EPSILON

Brothers Joseph W. Bostick '16 and Suman '12 enjoy the distinction of being the only members of Theta Tau in that part of the South, and would be more than pleased to see any Brother that should happen to be down that way. They have some real oil fields they could show them and perhaps some of the Brothers may be able to help them solve some of the problems of the puzzling salt domes in that area. Brothers Bostick and Suman leave on March 1st, on an extended field trip through Southern Texas. We will map the Tertiary formations in detail, also report on the economic resources.

Brother R. C. Eisenhauer '14 is with the Comet Mine, Basin, Mont.

Brother John B. Kerr '15, after March 1st, will be with the Coalinga Fresno Co., Cal., as he is leaving the State Mining Bureau to become assistant geologist for the Kern Trading & Oil Co. Brother Kerr has been in the service of the State since September 5th, 1916.

Brother W. D. McMillan '13 is in Belgian Congo doing prospecting work.

Brother J. B. Orynski '13 is with Eden Mfg. Co., Bluefields, Nicovagua, as Assistant Cashier.

Brother Roy Morse '13 is studying for his Ph. D. at the University of California.

Bro. John R. Suman '12 has recently been joined by Brother Bostick on the staff of the geological department of the Rio Bravo Oil Co., which is affiliated with the Southern Pacific Company and they are getting ready to do a couple years' field work in Texas and Louisiana along the Southern Pacific Lines with an idea to develop the mineral resources of those sections.

Brother Sid Bretberton is at Campo Seco, California, care Pennsylvania Mining Company.

Brother Dan McLaughlin visited the campus recently and is now at Harvard on the Secondary Enrichment Commission. He is also an instructor.

Brother Jack Peely is working with the Southern Pacific in their San Francisco office.

Brother Claire Waldner is at Selby, California.

Brother G. D. Smith is secretary to the Governor of Nevada, but is still doing mining work.

Brother Ralph Countryman is in the purchasing department of The Associated Oil Company, Richmond, California.

Brother Tom Kirwan has recently recovered from his operation and until recently was in San Francisco.

Brother J. A. Hendricks is working at The Empire Mine, Grass Valley, Cal.

Bother Rocca is in Humboldt, Arizona.

Brother Bostick is a geologist for The Rio Bravo Oil Company. His address is No. 716 Southern Pacific Bldg., Houston, Texas.

Brother Woodcock is still with the State Mining Bureau in the Ferry Building, San Francisco, and is always present when the pure copper vein is mined or murdered.

Brother Bill Geis and his grin were recently on the campus, but soon departed for parts unknown.

Brother Brunel is on the engineering staff of The Nevada Consolidated Copper Company at the open pits in Ruth.

Brother Hoenigman is working with the same company at their smelter in McGill.

Brother W. R. Brown, Gamma, C. L. van Derlip, Zeta, and C. F. Steinbach, Beta, are also with The Nevada Consolidated Copper Company.

Brother Stan Arnot was recently married and is now working at the Plymouth Mine on the Mother Lode, Calif.

Brother "Casey" Campbell recently returned from Mexico with his life intact and is now in Casapalca, Peru, South America, care Backus & Johnstone Company.

Brother Hegeman was working in Bingham Canyon, but is now fighting the same bed-bugs in Park City, Utah, with Brother Farnlacher.

Brother Coles is engaged in business in San Francisco with some electrical company, we believe.

Brother Cavins was at Park City recently, but his Sante Fe pass was too handy, so he returned to Long Beach and was married.

Brother Louderback has recently returned from his trip to China for The Standard Oil Company and was again seen wandering around by himself in the Berkeley hills as soon as the football games started on Saturday afternoons. With him returned Brothers Hudson, Morse and Taliaferro, all of whom are pursuing another degree here at Berkeley.

Brother Joe Waithman has been with The Farrish Company, an engineering concern, No. 532 Commercial St., San Francisco, but from the latest reports he has returned to Grass Valley.

The engagement has recently been announced of Brother John P. Buwaldo to Miss Imra Wann '17. Miss Wann is a member of Gamma Phi Beta. Brother Buwaldo has recently accepted an assistant Professorship in Geology at Yale, where he will make his home with the beginning of the Fall Semester.

Brother Art. Eaton was married recently to Miss Emily Churchill, a graduate of the University of California and a member of the Delta Gamma sorority. Brother Eaton has recently opened up offices in Southern California, where he is engaged as a consulting geologist.

Brother Emerson Butterworth graduated in December, 1916, and for the present is making his home at Santa Barbara, Cal.

ZETA

Brother William F. Price '13 is at present with the A. T. & S. F. Coast Lines.

"Pat" (G. B.) Murphy has left the Frisco and is now with Bates, Hager & Lewis, Consulting Geologists of Tulsa, Oklahoma.

"Hank" (H. E.) Samson is now with the Denver Light & Power Co., located at Amarillo, Texas.

Clyde Van Derlip is working with the Nevada Consolidated Copper Co., and mail will reach him at McGill, Nev.

"Slats" (L. E.) Cole is another miner located at Butte, Montana.

"Dick" (W. A.) Burton, Pete Buckhannan, Sam Cooley, Yassel Young and Claude Fletcher are now in the valuation department of the Santa Fe, with their headquarters at Topeka, Kansas.

"Buster" (N. W.) Brown and "Bill" (W. E.) Brown are also with the Santa Fe. Buster is transit man with headquarters at Amarillo, Texas, and Bill is located at Arkansas City, Kansas.

The following men now have headquarters at Kansas City and we suggest that they would be a good nucleus to form an Alumni Association.

Leland Angevine and "Pinky" (C. E. Painter are supervising engineers with Burns and McDonnell.

Russel Bodman and Floyd Nutting are draftsmen with the Kansas City Terminal Co.

E. G. Washburn and A. W. Templin are with the American Bridge Co., of Gary, Ind., loaned temporarily to the Terminal Co.

"Micky" (M. L.) McCune and John Butler are with the Kansas City Structural Steel Co.

Ray Deaver is with the Bell Telephone Co.

"Tony" (D. S.) James is master mechanic with Swift & Co.

Earl Newcomer is engaged in the undertaking business.

"Jimmy" Vawter is back with the Santa Fe at Galveston, Texas, after grabbing off a degree and a Sigma Xi key here last year.

"Andy" (A. J.) Groft is with the American Cement & Plaster Co.

G. C. Harding is with the Federal Bridge & Structural Co., at Wakesha, Wis., and his brother, C. W., is with the American Bridge Co., at Gary, Ind.

Ray Bartell is with the engineering department of the City of Des Moines, Ia.

Art Bowman is office engineer with the Engineering Department of Topeka, Kansas.

Chas. Coats is a chemist with the Chanute Spelter Co.

Sam Fairchild is now secretary to Lieut.-Governor W. Y. Morgan of Kansas.

Glenn Alt is with the Structural Steel Co. at Toledo, Ohio.

"Ute" (L. B.) Smith was with the Arizona Southwestern Copper Co., at Copperville, Arizona, when last heard from.

"Dick" (R. L.) Templin is in his second year of a fellowship at Illinois doing research work in reinforced concrete.

Leslie Dodd is with the Rock Island.

"Kenny" (K. H.) Gedney, our versatile little cheer leader for this year, left school in February to work for his father in the contracting business at Kansas City.

Karl Kaiser is now enrolled in the Kansas State Normal School. Karl starred on the basketball team for them this year just as he used to do for us.

Joe Moffet and Henry Staley dropped in on us at Thanksgiving time.

"Jimmy" Parker is now in the oil business located at Tulsa, Okla.

B. A. Ruth is now with the Hotpoint Electric Heating Co., at Ontario, Can.

We mourn with Prof. H. A. Rice, our National Grand Marshall, the loss of his wife, who died March 18, 1917.

We also mourn with Brother P. A. Diehl the loss of his father, who died in January of this year. Brother Diehl was forced to quit school in the middle of this, his senior year, but will be back next fall to finish up.

Brothers Newcomer, Angevine, Deaver, and Staley have been married since the last Gear publication. If there are any other new benedicts among us, they have not reported. "Hank" Samson passed around the cigars last fall but blushing would not give us any details.

We had two men on the border last year, both officers in the Kansas State Militia. Capt. Sam Fairchild, Headquarters Co., Third Regt. Inf., and 2nd Lieut. "Tony" (D. S.) James, Supply Co., Third Regt. They both had some thrilling incidents to relate when they returned this last fall.

Brother Frederick C. Bryant '14 is at present engaged with the Allied Machinery Co. of America in Paris, France.

Brother Algernon T. Gibson '12 is actively interested in the Lawrence Warehouse Co. of Oakland and Sacramento, Cal. Brother Gibson, besides being secretary of the company, has charge of the general office and supervision of the various docks and warehouses.

Brother A. G. Ranney '13 is a member of the firm De Puy & Ranney, General Contractors, San Antonio, Texas.

ETA

W. M. Africa '15 is with The Nashville Gas Co., Tennessee.

E. Barry '16 is with The Walworth Mfg. Co., Boston, Mass., manufacturers of steam fittings.

Beach '14 and Muther '13 have just formed the "General Development Company" and are located at Cali, Colombia, South America.

Brian C. Curtis '17 is "somewhere in France" with the American Field Ambulance.

Kemerton Dean '16 is with The American Agricultural & Chemical Co., of Boston.

C. Fiske '14 was married to Miss Marie Blood of Cambridge. He is employed by Kidder Peabody Company of Boston.

P. Fleming '16 is with The Goodyear Rubber & Tire Co., Akron, Ohio.

E. L. Fletcher '14 was married in February to Miss Hope A. Farwell of Providence. They are making their home in Steubenville, Ohio, where Brother Fletcher is in the employ of The Gas & Coke Company.

Hovey Freeman '16 is making a tour around the world and was last heard of from China.

Thomas Huff '15 is with The Standard Aeroplane Company of Plainfield, N. J., and is also instructor of aeronautics at the Massachusetts Institute of Technology.

Levering Lawrason '16 is with the "Central Mercedeto Co." at Cabanas, Cuba, as assistant chemist on their sugar plantation.

Roger Lord '16 is with The International Corporation in Paris.

O. B. Pyle, Jr., '16 is with The Bethlehem Steel Company at Baltimore.

H. W. Smith is on leave of absence from the Institute and is also in France under similar service to that of Brother Curtis.

Ralph Evans Wells, Jr., '14 is with The American Smelting & Refining Company, Murray, Utah. He was on the Mexican border with the Utah Militia.

THETA

Brother C. M. Brister, Jr., '14 is at present metallurgist for the Baltimore Copper Smelting & Rolling Co., Baltimore, Md.

IOTA

Brother C. A. Pierce '16 is looking forward to 1921, when the convention of Theta Tau will convene at Rolla, Missouri.

Brother J. S. Applegate of Delta was the guest of Iota Chapter at their initiation banquet. We feel sure that Brother John will do justice to the topic assigned him for the occasion when he speaks on "The History of the Fraternity."

Brother Wm. H. McCartney '16 has been transferred from Granby, Mo., to Sterling, Cape Breton, Canada, where he is local engineer in charge of prospecting work of the American Zinc and Hayden Stone Company of New York. He wishes the chapter the best of luck.

Word has been received from Brother C. A. Pierce '16, who is now located at Patagonia, Arizona, with the Ruby Copper Company. "Collie" sends his heartiest wishes to all.

After much roving about the country we now find Brother Bob Burg '16 at Miami, Arizona, doing engineer-

ing work with the Miami Copper Company. Address him in care of the Almaden Club.

Brother J. L. Head, better known as "Babe" sent the active chapter holiday greetings. This is the first anyone in the chapter heard from Head since he left. The postmark on the envelope was Warren, Arizona.

Brother Stifel is now vice-president of the Union Brewing Company, St. Louis, Mo. He made us a visit during the winter.

Brother L. W. Ehlers joined the benedicts last June. Brother Ehlers and his wife, nee Roxie Kennedy, are now living in St. Louis, Missouri, where he is employed by the Chicago, Burlington & Quincy R. R. in their engineering department. "Mike" is also interested in a zinc prospect at St. Joe, Arkansas.

Brother R. J. Anderson, who was one of the two founders of Iota, is now on the editorial staff of the Iron Trade Review, New York and Cleveland. He sends his best regards to all Iota men.

Brother B. W. Adams is instructor of physics in the University of Akron, Akron, Ohio.

Brother G. E. Johnson is chemist for the Arizona Copper Co., Morenci, Arizona.

Brother Chas. Teets (Gamma) made a short visit with Geib and Housholder on his way from Denver to Houghton, where he is now enrolled at the School of Mines there. He is always assured of a welcome in Rolla.

On account of the death of his father, Brother Beyer was called to his home in Long Island City, N. Y., the second week in March.

Brother James J. Dowd '16 writes from Houghton, Mich., that he gets to visit Beta Chapter quite often and thinks them a fine bunch of men. He is doing efficiency work at the Isle Royale Mine.

Brother L. A. Turnbull is with the Macon Motor Company, offices between 7th and 8th on Olive St., St. Louis. "Louie" expects to return to school next year to complete his course in civil engineering.

Brother T. C. Gerber is connected with the valuation department of the B. & O. R. R. His address is Norwood, Ohio.

Brother Golick expects to spend the summer in Chicago, Illinois; Weimer in South Eastern Missouri, Ambler in St. Louis, Geib in Denver, Cunningham in Columbus, Kansas; Reilly in Arizona, Weiser in St. Louis, Bowles in East St. Louis, Illinois; Housholder in Mohave County, Arizona (c/o Commercial Hotel, Kingman, Arizona). The other men in the chapter are undecided.

KAPPA

S. R. Derby, who was head of the Athletic Department of Lombard College, has spent the past year in Benton Harbor, Mich. It is rumored among the brothers that he is coming back to the University next year.

Harry Owens sprung a surprise on the boys when he got married as soon as he graduated. We all knew that it was pretty serious but we hardly expected him to cross the great divide so soon.

When last heard of J. H. Heindel was working in Elgin, Ill., with the Morres Co., Architects.

Carl Ernst is in Chicago working with the City Engineer.

Harry Rogers is in Canada with the Great Northern Railroad.

ALPHA

H. V. Kruse '14 and Miss Olive Berquist, a senior in the nurses' school at the University, were married January 27, 1917. Address, Sonora, Mexico.

R. W. Prouty '12 and Miss Florence Morrison were married May 20, 1916. Address, Morenci, Ariz.

R. A. Stickney '18 and Miss Mildred Bishop of St. Paul, Minn., were married February, 1917. Address, Flint, Mich.

B. H. Walling '09 and Miss Edna Lampert of Minneapolis were married February 21, 1917. Mrs. Walling is a member of Pi Beta Phi of Minnesota.

BETA

On August 5, 1917, C. F. Burt was married to Miss Elizabeth Shields of Hancock. Brother Allen acted as best man. Brothers King and Aldrich as ushers. Brother and Mrs. Burt are housekeeping at Yerington, Nev.

The engagement of Brother "Hap" Mills to Miss Helen Beacom was announced during the year. We congratulate "Hap" and extend our best wishes to Helen.

Brother Frank V. Hicks '15 was married in January, 1917, but we failed to hear to whom. They are at present living at Bisbee, Arizona.

GAMMA

Walter R. Brown '10 was married August 12, 1916, to Miss Lucy Ramonde Mitchell of Oakland, Cal.

DELTA

E. A. Taylor '11 was married August 5, 1916, to Miss Edith F. Bond of Cleveland, Ohio.

EPIILON

R. S. Rhodes '15 was married to Miss Grace Parker October 25, 1916, at Berkeley, Cal.

S. Arnot '14 was married to Miss Juanita Kybwiz September 9, 1916.

John P. Buwaldo was married to Miss Irma Wann '17, who is a member of Gamma Phi Beta.

Art Eaton was married to Miss Emily Churchill, a graduate of the University of California.

Sidney E. Bretherton, Jr., '15 was married to Miss Mildred Van Gulpen '15 of the University of California July 3, 1916, at Angles Camp, Cal. Miss Van Gulpen is a member of Gamma Phi Beta.

ETA

C. Fiske was married to Miss Marie Blood of Cambridge, Mass.

R. L. Fletcher '14 was married to Miss Hope A. Farwell of Providence, R. I., February, 1917.

ZETA

C. M. Coates '13 was married to Miss Esther Bette of Independence, Kan., January 8, 1916.



1. Survey Camp—Lake of the Woods.
2. An Unsuccessful Illustration of the Lake of the Woods Survey.
3. High Water Marks—Nature, by growths of Lichen upon the Vertical Rock Ledges, has assisted the Engineer in determining the Maximum High Water Mark under Natural conditions.
4. Rodman giving a topographic "Shot" in open Marsh or Bog.

THE INTERNATIONAL JOINT COMMISSION AND
OUR NORTHERN BOUNDARY WATERS

The Lake of the Woods

By George M. Shepard, Alpha '09

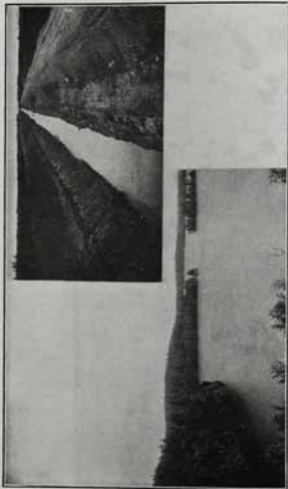


IN 1909, a treaty was signed between the United States and Great Britain, for the purpose of preventing disputes regarding the use of the boundary waters between the United States and Canada, and of adjusting all disputes then pending. It is not, perhaps, a matter of general knowledge that such a treaty exists, or that there are disputes along our northern frontier, of which more than half consists of navigable waterways. Territorial questions have long since given place to the many differences which are bound to arise where international waters are used on either side of the line for public water supply, sewage disposal, water power, transportation, etc., without a knowledge as to the effect of these uses upon the riparian and commercial interests on the other side.

This treaty provided for the creation of a joint tribunal, consisting of three citizens of each country, to which all disputes arising along their common frontier can be referred and amicably adjusted.

One of the first references to this International Joint Commission, that of the future regulation and control of the waters of the Lake of the Woods and its tributaries, brings again to public notice a region which in the past has been of more than passing importance in the development of the American northwest.

This lake lies between the State of Minnesota and the Provinces of Ontario and Manitoba. The international boundary passes through it in cutting that curious familiar angle, before dropping south to the forty-ninth parallel. Its waters, collected from twenty-seven thousand square miles, an area greater than all of New England except Maine, form the Winnipeg River, which flows



5. Drainage Ditch and Highway along the United States Shore.
a. Typical Character of Canadian Portion of the Yoho of the Woods.

northwestward and enters the great Nelson River system. The lake itself, with an area of fifteen hundred square miles, is somewhat larger than the State of Rhode Island.

A century ago, this Lake of the Woods region was more widely known than it is today. The regulation of the frontier fur trade at that time was a pressing domestic problem. The northwestern boundary, after several fruitless conventions, was still undefined. These older questions have been followed by more or less local controversies incident to present settlement and development. For thirty years, a dam at the outlet of the Lake of the Woods, in Canadian waters, has raised the lake level for the benefit of navigation in both countries. In so doing, thousands of acres of agricultural land, upon the south or United States shore, have been periodically submerged. To this primary source of irritation, succeeding years have added the important question of fisheries, reservoir storage for water power, summer resorts, and public water supply, all of which are directly dependent on the regulation of its waters.

The different type of shore line in the two countries does not lead to a ready settlement. The Canadian shore, with its rocky outline, is little damaged by artificial levels of the lake. From their point of view, the Lake of the Woods is useful principally as a storage reservoir for increasing the utilizable flow of that great power stream, the Winnipeg River. The point is well taken, since the most advantageous use of these waters, from this angle, would increase the dependable twenty-four hour power on this river from 300,000 to 500,000 horse power, and this in a region where the cost of steam power is prohibitive.

On the other hand the shores in the United States are low-lying and tend to become swampy when submerged. When drained and cultivated, these lands produce excellent crops, and although rendered unfit for use by pres-

ent artificial conditions, are being held by the settlers as an important factor in the ultimate settlement of a definite level.

American fishermen hold with justification that the maintenance of a high stage will result in the washing of muskeg from the shores into their nets, and thus destroy the valuable whitefish and sturgeon fisheries now existing there.

From the outset the settlement of the entire question was acknowledged to hinge mainly upon engineering investigation. This investigation naturally resolved itself into two parts, the survey of lands subject to overflow, and the assembling of hydrological data.

When the consulting engineers for the Commission, one from each country, took up the problem in 1912, the lack of relevant data was disheartening. It soon became evident that a complete topographic survey of all lands subject to overflow would be necessary. Parties were placed in the field in 1913, and during that and the following year about three hundred miles of shoreline were covered and a total of sixty thousand acres surveyed with sufficient accuracy to allow the placing of one-foot contours on the maps.

The engineers were particularly fortunate in being able to utilize the observation and signal towers erected by the International Boundary Commission in their secondary triangulation carried on in connection with the re-establishment and marking of the boundary from the "northwesternmost" point of the Lake of the Woods, to Lake Superior. Intermediate topographic signals were then set so as to form a tertiary system of triangulation which in turn was co-ordinated with the secondary system. Between topographic stations, azimuth stadia traverses were run to constitute a control for the planetable surveys employed to obtain the topography.

On account of the physical character of the shoreline, much of the field work was accomplished under extreme

difficulties. Rodmen were required to wade waist deep in marsh or muskeg for days at a time. Suitable camping sites which would give easy access to the lake were few and for sanitary conditions had to be selected with care. During the summer months, mosquitoes, deer flies and other insect pests added their torture to the hardships the field man endured.

In spite of all this, excellent progress was made. Two main camps were operated, each camp being the base for a number of parties. Moving and the hauling of supplies was accomplished by a large gasoline launch attached to each camp. The "Evinrude" motor attached to rowboats was found well nigh indispensable to the smaller field parties.

By far the greatest task of the engineers has been the collecting and working up of a report on hydraulic possibilities, from the meager data then existing as to levels, stream flow, and precipitation. While this office work was being carried on a number of gauges, with permanent stream gauging stations, were established on all the important streams flowing into and from the Lake of the Woods. The engineers were again fortunate in entering upon the work in 1912, at the end of an extreme drought, when the discharge from the lake was at its minimum, and completing it after the extreme flood of 1916 was experienced, thus giving them accurate measurements of precipitation and run-off for both extremes.

An interesting and very material hydraulic problem which was neatly solved, was the determination of the natural level of the lake during the past, if the dam had not artificially controlled it. Another problem was the fixing of "ordinary high water" mark, the point to which, in the United States, the federal government may exercise the power of eminent domain in the interest of navigation.

It is true that on the steep shore, nature, by growths of lichen, has preserved a record of the extreme floods of the past, which marks from a distance appear to be lit-

erally engraved upon the rock. Extreme high water marks are not, however, ordinary high water marks. Ordinary high water mark has been defined in our courts as "being the point up to which the presence and action of the water is so continuous as to destroy the value of the land for agricultural purposes." On the south shore, where the various gradations from swamp to upland render such a definition impracticable, the engineers have resorted to a percentage of time solution.

Complete estimates of cost were made, covering all points of damage and benefit to the various interests involved, for a number of different plans of regulation. During the first week of April, 1917, the Commission met at Washington to give final consideration to the matter, and to present its report to the two governments.

In this quiet way a dispute that has been the cause of growing irritation between the local inhabitants of a considerable portion of our northern frontier will be settled once and for all, by resort to no other means than a just and common sense consideration of the claims of all parties.

April 3, 1917.

THE USE OF THE STRAIN GAUGE

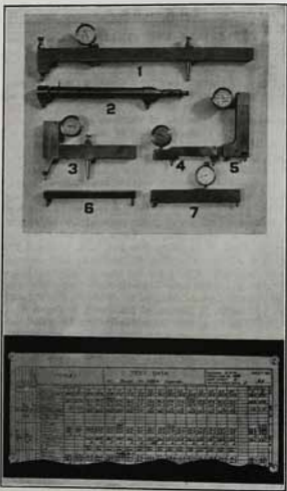
By R. L. Temple, '15, JEN. AM. SOC. C. E.



THE strain gauge, as its name implies, is a form of extensometer for measuring strains in materials such as steel, brass, stone, concrete, etc. From these measured strains and the known moduli of elasticity of the materials, a fair approximation of the actual stress in the material may be made. As this article is not intended to be a history of the development of the strain gauge nor yet a detailed description of its many forms, it shall suffice to say that the instrument consists essentially of a system of suitable levers and micrometer screw or dials whereby strains as small as 0.00002 in. may be detected.

The accompanying cut shows some of the latest and best types of strain gauges. Those made after the designs of Prof. H. C. Berry (see Nos. 1, 3, 4, 5, and 7), are some of the best. The Illinois types (not shown) are similar to the Berry types but have different multiplying ratios and are in some instances made from aluminum. A micrometer type as designed by James E. Howard and used by the U. S. Bureau of Standards, is shown (see No. 2). The types with the self-indicating Ames dial are to be preferred rather than those with the micrometer screw because they are speedier of manipulation and generally more accurate. The adjustable gauge length, length of legs, multiplying ratio, and form of instrument are details of personal fancy or of special test requirement. A multiplying ratio of five and a dial indicating to one-thousandth of an inch, for any gauge length from two to twenty inches is generally to be preferred.

With some forms of the Berry instruments special clamps are provided for direct attachment to the specimen. This is especially advantageous where only one gauge line is used and the specimen to be tested is of such a form to readily permit of direct attachment such as rods



or bars of metal. The strain gauge, however, is most useful where there are many gauge lines, readings upon which are to be taken successively by an observer with one instrument. In the latter case as many as eight readings per minute may be taken by an experienced observer. The speed of the observer is dependent to a great extent upon the location of the gauge lines, that is, their accessibility.

The gauge lines are best laid off with rigidly connected center punches (see No. 6 in cut). The lines are located in the direction and at the place where the strain is to be measured. The gauge holes may be any size from those made with a No. 60 to a No. 54 drill. The No. 54 drill has been found to work very satisfactorily and is much used. Often times a good center punch mark is sufficient. The portable electric drill is to be preferred for making the holes but any light form of breast or hand drill will serve. The holes when drilled should be about one and a half times their diameter in depth and should be clean cut with no wire edges. Holes on flat surfaces work best but satisfactory results may be obtained on concave and convex surfaces. The burr on the edges of the holes may be removed by a special facing tool or a center punch inserted and rotated a few times as slight pressure is applied. If it is desired to measure strains in stone, concrete, or similar material, soft iron or steel plugs about $\frac{3}{8}$ in. in diameter and $\frac{1}{2}$ in. long may be inserted in holes drilled for them and held securely in place by plaster of Paris. The gauge holes are then marked and drilled in these inserted plugs. Another method is to use small metal disks similar in size to a one-cent piece with gauge holes drilled near their centers. These disks are then stuck on the stone or concrete with plaster and spaced the correct distance apart with the rigidly connected center punches while the plaster is yet soft. Where considerable time may elapse between observations on any set of gauge lines and the gauge lines will be subject to the

inclemencies of the weather, it is generally best to keep the holes filled with hard oil when not in use.

There are two good methods of taking observations with the strain gauge. In the first of these the strain gauge is held firmly as its movable point is inserted in one of the holes of the gauge line. The other point is then inserted in the other hole rather sharply a number of times, meanwhile noting the readings of the dial. The mental average of these readings constitutes an observation as called to the recorder. If the readings show considerable variation the difficulty may often be overcome by slightly rocking the instrument in the holes transversely with respect to the gauge line. The position of minimum reading or where the hands of the dial shows least motion should then be used as a criterion of position for successive readings.

In the second method the instrument points are inserted but once in the gauge holes and the rocking motion used to determine the reading. This method is speedier than the former but may not always be found as accurate. In both methods care should be used to always assume as nearly as possible the same position as was used in taking previous readings. Also it is generally advisable to insert the same point in the same hole each time since this tends towards better results.

The instrument itself should be checked for errors in adjustment by a micrometer calibration block. Temperature effects can be overcome by using suitable standard bars having gauge lines which will be subject to the same temperatures as the specimen or member being tested. If readings are being taken on steel imbedded in concrete, for instance, the standard bar should be imbedded in concrete or plaster of Paris. The standard bars should be placed in as convenient a position as possible and readings taken on them before and after the series on the other gauge lines. If the number of gauge lines is more than say twenty, a standard bar reading should be taken

in the middle of the series. The best instruments are now made from Invar steel so the temperature effects can be entirely eliminated for all practical purposes by use of suitable standard bars, thus simplifying the reduction of the obtained data.

The form of data sheet for strain gauge readings is more or less governed by the nature of the test and the fancy of the recorder. A tentative form is submitted herewith which is similar to that found very satisfactory in many of the University of Illinois tests. For the most part it is self-explanatory. Generally, averages of two or three series of zero readings are sufficient for the accepted zeros. A limit of desired accuracy is predetermined and the observations repeated in a series when mental comparison by the recorder shows them not to be within this limit. The corrections are determined from the average standard bar readings just before and after the series in which the observations to be corrected occur. The corrections may be made after each series or after the test is complete, the latter procedure being generally preferred.

The observations are determined to the estimated tenth of a division of the dial, generally, and as soon as noted are called to the recorder who repeats them immediately to avoid errors. The data sheets are best made in duplicate, using carbon paper. The carbon copies are then separated from the originals and filed away as soon as possible as a safeguard in event of the loss of the originals. From the final results obtained, after the data has been worked up, curves are plotted on suitable co-ordinate paper. These show at a glance the stress-strain relations and are good graphical summaries of the results obtained.

In conclusion, it may be said that while the strain gauge has to date found its largest field of usage in the testing laboratories, there is, nevertheless, a growing demand for it in many field tests. It has been used to test steel and reinforced concrete buildings and bridges, cranes, girders, slabs, beams, columns, car wheels, car couplings, and many other structural members and units too numerous to mention.

EARTH ROAD CONSTRUCTION AND MAINTENANCE

By Wendell P. Chapman, Alpha '14.



THE development of the automobile to its present high standards and the recognition of its value, not only as a pleasure car but as a commercial necessity, has opened a new field in engineering and brought about a demand for good roads, the magnitude of which has never been paralleled by any similar move for an internal improvement.

While Highway Engineering is not by any means a new branch of our profession, its importance is just beginning to be recognized by the general public. Nearly every town, large or small, has its commercial club, automobile club or civic association of some character, one of the main functions of which is to promote schemes for bettering the highways of the community in order to draw trade to the given center.

The technical engineering journals have recognized these facts and nearly every issue of the magazines devoted to civil engineering contains one or more articles which relate to highway legislation or highway construction. It is to be regretted, however, that most of the space is devoted to concrete roads or other types of pavements, while the construction and maintenance of earth roads is lost sight of almost entirely.

Engineers eagerly absorb such articles since the traffic on the arterial roads in hundreds of communities is such that paving is necessary, but as in the construction of a railroad, the laying of the steel is not the greatest problem which is encountered, similarly in highway construction there is a vast amount of work to be done before the surfacing can be placed.

When it is remembered that over eighty per cent of our roads are earth roads, and must of necessity for some time to come remain earth roads without any surfacing

whatsoever, for the reason that the traffic imposed does not warrant an expensive surface, the magnitude of the earth road problem can be realized to some extent.

The first step to be taken in the development of a road system in a given community is to employ a Highway Engineer and make a survey of the road situation, not an instrument survey but a study of the transportation problems. The determination as to the type of road, which road shall be constructed first, and the amount of funds to be raised, either by tax levy or bond issue, should be based upon definite and positive data showing the needs of the community and the probable use of the roads. After these determinations are made, the Engineer should be authorized to plan the work and carry it through and be held responsible for all details of plan and execution. With the adoption of such a policy and the exercise of good judgment progress is assured.

One of the most important points to be considered in the detail planning of a road system is location. Poor location has been due in many cases to the tendency to follow first trails or to holding strictly to subdivision lines. Factors to be considered in determining location are volume of traffic, limiting grades, possibilities for adequate drainage, and last but not least, safety during all seasons of the year. Sharp turns should be avoided and in all cases there should be a clear sight distance of two hundred feet and a radius of not less than seventy feet. As to gradient, a maximum of five per cent should be located if possible. Location and grades determine the limitations of all future travel, and should be studied carefully.

In building an earth road, it is very important to eliminate all vegetable matter from the upper one and one-half foot of grade. Sods should be wasted or placed in the bottom of fills, for such vegetable matter only acts as a sponge. If a roadway is not completely drained with wide, deep side ditches and offtakes which have a good

outlet, more water is apt to reach the road surface by capillary attraction than by rain falling upon it. If springs exist under the roadway, a line of drain tile laid beneath the center line of the crown is a very effective remedy.

The most common neglect of drainage is found where grades are built by borrowing material from the sides with blade graders. On such work the profile of the ditch conforms with the contour of the ground, leaving water in the depressions which saturates the grade. Blade graders are essential to both construction and maintenance and will move material from the ditches to the roadway at less cost than any other method, but there is always a tendency when using these machines to make the work too light, and the requirements for drainage are overlooked in the desire to cover a large mileage at a low cost.

After having a few years' maintenance experience, an Engineer will always insist upon doing heavy, substantial earth construction, for in most cases, the first work laid out has to be rebuilt on account of being too light and frequently a surfacing of possibly gravel or macadam has been applied which is lost through the poor foundation work, or has to be thrown away due to the necessity for rebuilding the grade.

An important point in road specifications, particularly on cut and fill work, is to require construction dragging which means that a road shall be constantly dragged during the building of the grades, thus giving the successive layers of subgrade a uniformity of firmness which will prevent chuck holes and ruts on new work. In heavy sliding clay fills, it is also advisable to place layers of brush at each two-foot lift in the building up of the grade. The brush should be laid in sufficient length to reach beyond the frost line which will prevent the usual breaking down of the shoulders of new fills in rainy weather.

The cross-section for earth roads should not be rigidly standardized, but the width of the travelled portion should be determined by the volume of traffic to be served, never being less than twenty feet, and the slopes and crown should be governed by local soil conditions. Standard sections are advisable, however, to be used as guides for typical conditions. Dressing and trimming of slopes, lining up of fills and the adoption of a uniform type of culverts and culvert railings for a given road add greatly to the value of the work in the estimation of the public.

Any road construction is without permanent value unless an adequate system of maintenance is established and rigidly enforced. This is especially pertinent to earth roads. The poor reputation attached to earth roads is due largely to the lack of care in their upkeep. Road maintenance is a business in itself; it is almost an art. While methods differ in various locations, it is necessary in all cases where the best results are to be obtained, to have an organization with one head who shall be responsible at all times for the condition of a definite mileage.

The details of maintenance work are so varied and so dependent upon local conditions that it is difficult to lay down a set of requirements which will cover the situation in a whole state. Firstly, the road must be made ready for maintenance. The use of a light grader in opening up drainage and bringing back the crown of the road is almost necessary each spring, and on most roads this should be done several times during the season. Crews should be sent out late in the fall and early each spring to open culverts and lines of drainage, and general repairs to the grades must be made before defects become serious. A great deal of expense due to washouts may be avoided by adopting some method of opening frozen culverts, as, for instance, the placing of a shovelful of salt in the ice at the head of a culvert will force an opening, or a small pipe plugged at both ends may be placed in the culvert in the fall and allowed to freeze in; then

in the spring the ends are opened and water allowed to run through, thereby starting a channel. In some cases it is necessary to have two culverts, one of which is closed during the winter.

It is generally agreed that dragging is the principal feature of earth road maintenance. A road surface which has been travelled for some time becomes consolidated by what may be called a puddling action and if the road is kept crowned and smooth, this surface will permit the water to run off before damaging the road bed. The constant use of a road drag will, by spreading at frequent intervals a thin layer of puddled earth over the road surface, tend to build up an impervious crust which will resist the action of moisture and abrasion of vehicles.

It is the management of the dragging, however, which makes or breaks the effectiveness of a maintenance system. The road must be caught at the proper time after each rain, that is, while it is drying and in a mealy condition so that after the drag has passed, the sun will bake the surface into a tough crust. Dragging which is done too late is a waste of time and money. Usually about two or three miles makes up the length of the beat when horses are used and about eight miles when light tractor outfits are used.

The kind of drag to use has been quite a study, and although many so-called split-log type drags are in use, it has been demonstrated that light graders and long runnered planers are superior. The split-log type of drag does not level the road longitudinally, but tends to gouge out depressions, while an implement similar to the Minnesota road planer will level the road longitudinally as well as transversely and will reduce the waviness found so objectionable on many highways.

To get the best results, the superintendent in charge of maintenance must get the men to take pride in their work and make each feel a responsibility. If they can be

gotten to compete with each other, each trying to get his beat in better condition than the man who maintains the next section, a very desirable condition has been established.

It is all important that a good organization be developed for carrying on the different branches of the work and more important still that the various rulings and provisions be rigidly enforced. Last of all, the old saying is particularly applicable here that if Engineers would devote more of their time to publicity and keep the public well informed as to their proceedings, their efforts and results obtained would be more highly appreciated.



Northern Chinese types. This was taken in a village in the northern interior (Szechuan Province), and is of a crowd that was waiting for a religious procession. They departed the roadway to see the foreigners. Note the wadded clothes (like quilting), used in the north in winter. The walls about the temple grounds are of mud (adobe.)

In Shanghai. From left to right, Hudson, Kagan; a friend (not a member of the party), Tullifern, Moran.

CONDITIONS FOR GEOLOGICAL WORK AND PROSPECTING IN CHINA

By Prof. George D. Louderback, Epailon '98

ONE might naturally conceive the idea that the conditions for geological field work or prospecting in China would be very unfavorable, when he thinks of the great multitude of inhabitants, the long period during which they have owned and developed the land, the lack of sanitation, distrust of foreigners, superstition of the lower classes, etc. Such considerations introduced to my mind doubts as to the possible effectiveness and desirability of work there when in 1914 I undertook a year's expedition into the interior of China, which later, however, was lengthened to a second year. But it was not long after actually getting into the field, that such doubts were dispelled, for the conditions for work were found to be most favorable, the geology and scenery interesting and attractive, the people kindly disposed, and the numerous settlements more a help than a hindrance.

The American part of the party was thoroughly Theta Tau in composition, and included, besides the writer, Arthur Eaton, Frank S. Hudson, Roy R. Morse, and N. L. Taliaferro. And I am happy to be able to say that after two years in China, including the far interior, and the Philippines, the whole party returned safe and sound, satisfied with the venture as an enjoyable trip and the source of much good experience.

For the China trip, camp equipment and such food as it was necessary to carry was procured in Shanghai. Engineering and draughting instruments, chiefly British, some American, can also be obtained there, but anyone planning a trip into China would do well to select his instrumental equipment before leaving home.

The railroads of China are good as far as they go. But at present they are limited to the great plain and reach only a few hundred miles back from the coast. So

if one is going into the northern or central interior, he soon reaches the end of rail transportation. After that, the available types of transportation depend on the part of the country one is entering.

In northern China the climate is dry. The sun may get hot in the summer, as in the western interior of America, while in winter the weather is cold, and naturally in general colder, the farther north we go. Tientsin harbor, east of Peking, is often frozen in the winter time. But there is not much snow, for the precipitation is chiefly in the summer months. So geological work is quite feasible over much of the northern area during the winter. A few severe days, or an extra heavy snow, may occasionally cause temporary suspension of work.

The fall and early winter months are probably the best parts of the year for work in the north. The days are very pleasant, and the nights cool. In the spring, dust may fill the atmosphere, and in some places severe dust storms occur.

In general in northern China trees are scarce, and the country is open and formations well exposed, as in our western arid mountains. This is the country of the loess, and the valleys are largely filled with their material, which sometimes hides the bedrock geology over considerable areas.

The streams of the north, like the typical streams of arid country, are variable in water content, and in general not suitable for boat traffic. The main stream, the Yellow River (Huang Ho), is subject to irregular floods and extreme shallowing, shifting channels, etc., and is too treacherous and uncertain as a thoroughfare, and carries only a few local boats along more favorable stretches. So the commerce of the interior depends on land transport, chiefly by means of mules. For the long distance trips between Peking and the deserts of Mongolia, and between the highlands of Kansu and the water

or rail connections, camels are used. But they do not seem to be used locally between the other provinces of China.

Along certain routes carts are used. But the bulk of the country, especially in the mountainous portions, has no cart roads, and goods are packed on mule back. They have good mules that are obtainable for hire, with mule tenders included, for forty to sixty cents a day, at points where the main roads leave the railroad lines, and also at most large towns.

In the central interior conditions are different, and mules are rarely used. Here the winter is mild, and as it is in the dry season, it is a good period for field work. And no climate can excel the spring time in Szechuan. But the summers are hot, sultry and rainy, and not conducive to physical activity or energetic thought, especially along the line of the Yangtze River and its main tributaries. This is also true of the summers of south China.

The Yangtze River is the Mississippi of China, and probably carries as great a traffic as any river in the world. It and its branches, the Han, Kialing, and the Min, are the great arteries of trade of central China, and throughout this region, transportation is mainly by boat, even up to the smaller branches of the tributaries.

Most of the important towns are situated along the rivers, and the country between streams is, in the interior, served chiefly by pack coolies. Some of these carry goods on their backs on frames or in baskets, some in baskets hung at the ends of a pole; extra heavy packages may be slung from one or two poles with a man or men at each end. Wheelbarrows are also used in some localities. It is surprising what loads can be carried.

We went into the north, starting up the valley of the Yellow River, and after several months' work, crossed the mountains into the central interior, coming out to the coast finally by way of the Yangtze River. So we

encountered marked differences in climate, modes of transportation, geology, people, crops, etc.

The Chinese towns and villages are more concentrated than ours. In general they occupy perhaps one-sixth to one-tenth the area of towns of the same population in America, and this notwithstanding the absence of skyscrapers, and the prevalence of one-story buildings. The houses are packed closely together, without spaces between, the streets are narrow, and many persons live in a house. Suburban residential districts with large lots or grounds are not to be found as in America, and consequently the land close to a large city will frequently be open and available for examination.

Besides, there are no fences in China, and one may go across lots in any direction he pleases without hindrance, if physical conditions permit. Anyone who has done field work in America, and has been confronted and discomfited by high board fences, barbed wire fences, signs of "no trespassing," "keep out," locked gates, etc., will appreciate the great relief of traveling through a fenceless country with no warnings against trespassers. This freedom was more helpful in the north of China, for in the central and southern parts rice fields are abundant, and these are flooded much of the time. No one would care to use a flooded rice field for a short cut, or for geological observations.

The mountainous country is only sparsely inhabited, and much of it is in a wild, almost primeval condition. One of the surprises of the trip was finding that so much of the country is in a condition as near to nature as the mountains of the western part of America.

As to the transportation of ourselves, we had ponies to ride, but probably walked two-thirds of the way not covered by rail or boat. For no mode of locomotion is quite so favorable to geological observation as footwork. Our horses were used chiefly over the loess plains or alluviated valleys, or in trips to and from special locali-

ties where the intervening country was not to be studied, and time was an object.

The people were curious about our looks and our doings, and sometimes got in our way. But they were everywhere well disposed, and especially when they learned that we were Americans. All through China there is a strong feeling of friendship for America and Americans, and conditions were never better for the peoples of these two countries to get together, to get into business relations, than at present. The Chinese prefer to do business with Americans, for the Americans have done good work there, have succeeded on a merit basis, and have not used business dealings as a pretext for political encroachments.

More business enterprises, engineering projects, and mining operations would have been undertaken by Americans, at the request of the Chinese, were it not for the opposition and interference of other foreign nations. This is an important matter to us who are interested in the mineral industry, and in engineering projects, but it is too large a subject to discuss here.

Certain types of food that most Americans like are not obtainable in general in the interior, such as coffee, chocolate, milk, mush, jam, cheese, etc. They are not used by the natives. And there are other things that they do not use in the form that we are accustomed to, and things which it may be desirable to take with one for variety's sake, or to tide over lean stretches of country. But the bulk of essential foods can be bought along the way. If one does not care to eat them cooked and prepared Chinese style, he may get a cook on the coast who has worked for some foreign family or hotel and can cook "foreign style."

Some Americans have a prejudice against using the local meat and vegetables, but they are undoubtedly nutritious and they taste good, and if cooked well before eating, there should be no fear from the health point of

view. They have many vegetable products that are not found in this country, and some make very tasty dishes.

We were glad to find potatoes, both "Irish" and sweet, in most of the districts we visited, although it was hard work to get the cook to buy and prepare them, for he thought it was hardly proper for such gentlemen to eat this cheap coolie food, which is not found on the tables of even the moderately well to do over there. If he had only known how aristocratic the potato was to become in America!

This naturally suggests the H. C. of L., and leads me to quote a few figures. Almost everywhere in the interior we could get fresh eggs at 2½ to 3 cents a dozen; chickens at 6 or 7 cents apiece; wild pheasants (most toothsome!) at 12 to 15 cents apiece. And then, for several months, we traveled through game country, and the larder was constantly supplied with wild pigeon, duck, goose and pheasant, chiefly through Brother Eaton's shotgun work.

It would be a long story to tell about the geology and scenery we encountered. There was considerable variety in the formations and structures encountered in the different parts. And fortunately, over most areas the rocks were well exposed. As to scenery, we saw types characteristic of arid hills and valleys, humid hills and valleys, great rivers, plains, meadows, parks, cliffs, plateaus, high mountain peaks and ranges, rocky canyons, and finally the great gorges of the Yangtze River.

China has a variety of mineral resources, and the Chinese have developed methods for mining and working many of them. We saw many coal mines, also copper and iron mines, gas, brine, and oil producing wells, quarries for blocks of rock for construction work, lime quarries and kilns, pottery kilns, gold placers, etc.

Altogether, China is well worth seeing. It has interesting geology, attractive scenery, and valuable mineral resources, which are all worthy of investigation. It will require the carrying out of various engineering projects

in the near future, in railroading, power development, manufacturing, mining, irrigation, flood control, and other lines. China needs the assistance of foreign capital, and of foreign engineers. It welcomes Americans, and I hope that Americans will play an important part in the development of China's great territory and natural resources.

PUBLIC AFFAIRS AND THE ADMINISTRATIVE ENGINEER

By T. L. Hinckley, Hon. Alpha '08



BRIEF reflection upon the course of events in the field of American public affairs during the past ten or twenty years leads one to the conclusion that what may be termed a "silent revolution has been taking place.

When we compare the wholesale political corruption and lawlessness of a generation ago with the bulwarks which have been and are still being raised to maintain the decency of our common government—municipal, state and national—this fact becomes self-evident. The man who preached civil service, short ballot, open budgets, publicity for lobbyists and public statements of political expense in the days of Tweed was a visionary; today he is passing into history.

Service the Modern Standard

In what does this change consist? Are men any better than they were? Has human nature altered for the better? Possibly both; but a few decades is a very short time for such epoch-making changes. While better men have stepped into public life and while public opinion no longer tolerates the civic theft and bungling of a former day, it would seem that, in general, the change has been one largely of degree of the *emphasis* now placed upon certain factors in public service. While "public-be-damned" tactics was the rule in the past, the public today demands of its servants a very different standard of conduct, which may be summed up in the one word—*Service*.

Today the public official, or the public employee, who fails to render real service to the public is a marked man. The politicians cannot use him, for he gets them discredited; the public will not use him because they know that if one official, or one party, does not give service, another can and will.

The Administrator in Public Life

It is this reversal of emphasis in our public life which gives the technician his chance—and by technician is meant not merely the man who knows how to do specific things but the man who knows how to see that specific things are done. It includes both the technically trained man and the administrator.

Today a public job—be it engineering, accounting or anything else—is not a disgrace, nor does it compromise a man's future. Through holding public office and performing public work many of our present-day civic and political leaders have been enabled to "arrive"; recognition of exceptional ability is common in public life. The municipal engineer who can build a bridge, or a sewer, or a tunnel with speed and efficiency is in demand by municipalities the country over. Similarly, the man who can manage public business, secure economy in service, or devise money-saving or money-making programs for a public corporation, is almost sure, sooner or later, to be called to bigger work in a bigger city.

The skilled engineer in public employ is hardly a new thing, even in our own country; abroad he has been a regular feature for a century or more. But the skilled *administrator* in public affairs is a new thing with us, although here again Europe can show us fifty years or more of professional public executives. While it is quite true that the ability to manage people and to direct work depends more upon the man himself than upon his training it is also true that engineers and scientifically trained men are, by the very nature of their calling, very favorably placed for the development of executive habits of thought and action. If a regenerated public service offers any rewards for executive ability, it certainly affords an opening for engineers with administrative experience.

Special Case of the City Manager

Just at present the city managers of our fifty-odd so-

called "manager-type" cities are the most obvious illustration of these truths. These city managers are mostly all engineers with administrative experience—that is, technically trained men who in the course of their day's work have had to acquire the faculty of seeing that things were done, not by themselves but by others especially employed for the purpose. They have acquired the science of administration in addition to their technical specialty.

One asks whether such a function as that of city-manager is of general enough application to permanently attract administratively trained engineers—whether a definite limit as to population (and hence salary) does not exist. In reply, it can only be said that for a good administrator, a \$10,000,000 corporation is just as easy to operate as a \$10,000 corporation, provided the organization in each case is suitable. An administrator does not undertake to do all things himself—he undertakes to see that they are done. Herein lies the error of those who measure administration by geographical units instead of functional units; and a city manager is just as conceivable in Philadelphia or New York as he is in Dayton, Ohio,—given the necessary degree of organization.

Co-ordination Needed in Public Affairs

At the least, it would seem that all cities of any size could with profit employ a co-ordinating official of some sort—irrespective of title; for in the lack of co-ordination of public activities and agencies lie most of our civic troubles—state and national as well as municipal.

Social Viewpoint

There is just one caution to give to engineers or other scientifically trained men who may decide to compete for civic honors, or civic employment. It is this: do not underestimate the strength, or the value to society, of the technically untrained men. Public life and the public service is full of men who have made their way without

possessing any of the specialized knowledge which modern conditions of civilization are demanding of public servants in an increasing degree. Most of them do possess another qualification, however, which is just as valuable and necessary to society—namely, the *social point of view*. And unless the technician is able to acquire this same social point of view—the capacity to execute plans and to measure results in terms of an entire community, instead of only according to their specific merit—then he will find himself at a disadvantage in dealing with many types of men in the field of public affairs. Given the combination of technical and administrative training or experience, *plus* social viewpoint, and there are no limits to the success which a persevering man may attain.

GEOGRAPHICAL LIST OF ALUMNI.

ALABAMA

- Bessemer
C. B. Cameron
Birmingham
W. C. Settle
Mobile
C. D. Batson

ARIZONA

- Ajo
G. Elliott
Chrysotile
M. L. Bradt
Dewey
A. L. Ferris
Florence
A. E. Carlson
Globe
E. M. Marshall
Galconda
J. D. Warvig
Gerome
J. E. Wagner
Mayer
B. T. Rocca
Metcalf
R. B. Earling
C. Hoag
F. H. Wood
Miami
W. G. Sweeney
Morenci
C. B. Hostetler
G. E. Johnson
R. W. Prouty
J. R. Shanley, Jr.
C. M. Staples

Parker

G. S. Davis

Patagonia

G. A. Pierce
C. M. Staples

Superior

C. A. Kumke

Tucson

T. H. Garnett

Warren

J. L. Head

ARKANSAS

Williford

A. H. Mangelsdorf

CALIFORNIA

Atolla

G. A. Apell

Bakersfield

O. A. Cavins

Berkeley

J. P. Buwalda
E. F. Davis
E. A. Hersam
F. S. Hudson
G. D. Louderback
C. L. Moody
L. M. Orynaki
L. C. Uren

Campo Seco

S. E. Bretherton, Jr.

Hart

W. B. Andrews

Igo

E. K. Craig

CALIFORNIA—continued.

Los Angeles

J. B. Kerr

G. B. Moody

W. F. Price

Oakland

A. T. Gibson

R. R. Morse

Ontario

B. A. Ruth

Plymouth

S. L. Arnot

San Diego

W. S. W. Kew

J. R. West

Santa Marie

E. M. Butterworth

San Francisco

H. L. Coles

R. Countryman

A. Eaton

S. H. Gester

E. Woodcock

Shelby

C. E. Waldner

CONNECTICUT

Torrington

P. H. Buxton

COLORADO

Breckenridge

P. Hilsdale

Florence

L. Smith

Golden

V. Ziegler

Rico

G. F. Schreiber

R. R. Wiggins

Silverton

V. D. Howbert

DELAWARE

Wilmington

F. S. Hurlbutt

FLORIDA

Jacksonville

A. F. Shuey

GEORGIA

Savannah

L. F. Riegel

IDAHO

Wallace

A. S. Hill

ILLINOIS

Champaign

H. T. Rogers

R. L. Templin

Chicago

B. J. Curtis

W. R. Dorr

H. H. Hopkins, Jr.

F. J. Jerome

D. R. McEnary

E. E. Polly

Quincy

K. B. Bush

South Bartonville

C. A. Allen

INDIANA

Gary

C. W. Harding

Indianapolis

J. L. Bliss

KANSAS

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T. A. Madden
- Chanute
C. M. Coates
- Peck
P. A. Diehl
- Richmond
H. H. Staley
- Topeka
A. L. Boman
D. M. Rankin

MARYLAND

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C. M. Brister, Jr.
O. B. Pyle, Jr.
C. H. Strand

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- Boston
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K. Dean
C. P. Fiske
P. P. Furber
T. W. Little
J. B. Lowell
L. W. Snow

MICHIGAN

- Alpha
W. J. Perkins
- Calumet
J. G. Edwards
R. A. Loveland
- Detroit
H. M. Starrett
- Hancock
J. L. Ballard
- Houghton
J. J. Dowd

- Ishpeming
C. W. Nicolson
- Jackson
W. L. Mahoney
- Loretto
H. F. Mills
- Marquette
M. C. Drake
- Midland
E. R. Stein
- Pinex
H. E. Bird, Jr.
- Saginaw
R. B. Wagner
- Winona
C. P. Shields

MINNESOTA

- Buhl
C. H. DeVey
- Crosby
C. D. Peacock
- Duluth
E. P. Alexander
G. K. Urquhart
A. C. Badger
- Faribault
W. P. Chapman
- Hibbing
K. J. Duncan
- Minneapolis
M. C. Barnum
G. A. Dutoit, Jr.
C. F. Haglin
I. B. Hanks
P. E. Hinckley
G. A. Hult
N. S. Kingsley
G. A. Kristy
P. J. Laurence

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P. A. Laurence
R. E. Lutz
G. M. Shepard
W. D. Timperly
B. B. Walling
W. H. Wheeler

Riverton

M. W. Foard

St. James

T. H. Curtis

St. Paul

T. A. Askew, Jr.
J. E. Haynes
T. L. Hinckley
R. H. Milne
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H. Quinlan

Virginia

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Butte

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Ruth

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- HICKS, FRANK V. '15 BETA
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ROBERTSON, FITCH Student '18 403 West 11th St., Pueblo, Colo.	GAMMA
ROBINSON, H. A. Student '17 Kappa Sigma. Lawrence, Mass.	GAMMA
ROCCA, BERNARD T. B. S. '15 Alpha Tau Omega, Tau Beta Pi, Sigma Xi. Mayer, Ariz. Engineer, Bluebell Mine.	EPSILON
ROCKWELL, HARVARD S. '15 Sigma Alpha Epsilon.	ALPHA
ROCKWOOD, FLETCHER '15 Psi Upsilon.	ALPHA
ROGERS, HARRY T. B. S. '16 Phi Kappa Psi. 833 Pine St., Champaign, Ill. Architectural Engineer, Grand Trunk New Car Shops.	KAPPA
ROOD, LYNN E. M. '09 Delta Upsilon.	ALPHA
ROSE, HOWARD L. '16	DELTA
ROSE, WILLIAM A. E. M. '06 Delta Tau Delta. 619 Woodland Ave., Duluth, Minn. 700 Lonsdale Bldg., Duluth, Minn. Chief Mining Engineer, Pickands-Mather Co.	ALPHA
ROSS, RALPH H. Student '17 Lambda Phi. 10 Church St., St. Johnsbury, Vt.	ETA
ROUNDS, CHARLES K. '19 2075 Temple Court, St. Paul, Minn.	ALPHA
ROWELL, JOSEPH H. '13	BETA
RUBLE, ROLAND O. Student '18 2512 Crawford St., Parsons, Kans.	ZETA
RUFVOLD, OLAV M. B. S., C. E. '15 3050 15th Ave., S. Minneapolis, Minn. 300 Shubert Bldg., St. Paul, Minn. Bridge Inspector Minn. State Highway Commission.	ALPHA

RUPERT, ALLEN M. '11 Died January, 1911, near Silverton, Colo.	GAMMA
RUSSELL, DONALD O. E. M. '09 Tau Beta Pi. Kuala Lumpur, Selangor Federated Malay States. Ltd. British Royal Engr., France.	GAMMA
RUSSEL, JOHN A. Student '18 2733 Stevens Ave., Minneapolis, Minn.	ALPHA
RUSSELL, HARLAN A. Student '17 1733 Vermont St., Lawrence, Kans.	ZETA
RUTH, B. ALVIN B. S. '13 Upland, Calif. Hotpoint Electric Heating Co., Ontario, Calif. Draftsman.	ZETA
SADTLER, CHESTER B.	THETA
SAMSON, HENRY E. B. S. '16 City Light & Water Co., Amarillo, Texas. Engineer.	ZETA
SAWYER, ELDBETH L. A. B. '12 Phi Gamma Delta.	ALPHA
SCHABER, CARL F. B. S. & E. M. '12 Theta Xi.	BETA
SCHAFER, LOUIS E. M. '09 Kappa Sigma, Tau Beta Pi.	GAMMA
SCHEMMEI, JULIUS P. Student '17 513 Elmore St., Escanaba, Mich.	BETA
SCHILLING, KARL H. Student '17	EPHILON
SCHLOTTER, LAWRENCE C. '13 Sigma Nu.	BETA
SCHNEIDER, HENRY G. Student '18 1853 W. Colfax Ave., Denver, Colo.	GAMMA
SCHRAIDER, ERICH J. E. M. '05 694 Marshall Ave., St. Paul, Minn. Rockland via Yerington, Nevada. Mine Manager, Pittsburgh-Dolores Mining Co.	ALPHA
SCHRAMM, BERNHARD D. B. S. '11	DELTA

SCHRAMM, OTTO F. 3223 W. 100th St., Cleveland, Ohio. River Furnace Co., Cleveland, Ohio. Coke Department.	DELTA
SCHREIBER, GEORGE F. B. S. & E. M. '14 Marmatite Mng. & Milling Co., Rico, Colo. Leasing.	BETA
SCHROEDER, WALTER H. B. S. '11 Phi Delta Theta.	EPSILON
SCOTT, J. ALLYN, JR. '11 Phi Kappa Psi.	ALPHA
SCOTT, JOHN C. B. A. '15 Zeta Psi. 2138 W. 26th St., Cleveland, Ohio. 517 W. 54th St., New York City, N. Y. Assistant Director, Douglas Fairbanks Picture Co.	DELTA
SCOTT, JAMES R. B. S. & E. M. '11 Hartington, R. R. No. 1, Ontario, Canada. Manager, Feldspars, Ltd.	BETA
SCOTT, WALTER C. '09	BETA
SEGER, RALPH L. '14 Phi Delta Theta.	ZETA
SETTLE, WILLIAM C. '17 Psi Upsilon. Fairmont Apts., Birmingham, Ala. Crude Co., Birmingham, Ala. Assistant Shop Foreman.	ALPHA
SEVERIN, CARL B. S. '10 516 W. Boulder St., Colo. Springs, Colo. Metallurgist, The Portland Gold Mining Co., Colo. Springs Mills.	DELTA
SEWALL, EDWARD D. Student '17 S. B. 222 Bacon St., Waltham, Mass.	ETA
SEWARD, CHARLES D. '19 501 S. 2nd St., Neodesha, Kans.	ZETA
SHAAD, GEORGE C. B. S. & E. E. '00 Tau Beta Pi, Sigma Xi. Univ. Heights, Lawrence, Kans. Univ. of Kans., Lawrence, Kans. Prof. of Elect. Engineering.	HON. ZETA

SHANLEY, J. R. E. M. '15 Beta Theta Pi. Box 395, Morenci, Ariz. Mine Inspector, Arizona Copper Co.	GAMMA
SHEDWICK, WILLIAM J., JR. B. S. & E. M. '09	BETA
SHEFFIELD, FRED W. C. E. '09 Phi Gamma Delta.	ALPHA
SHELBY, EDWIN, JR. B. S. '16 Zeta Psi.	KAPPA
SHELDON, CHURCHILL G. B. S. & E. M. '16	BETA
SHEPARD, GEORGE M. C. E. '09 Tau Beta Pi, Sigma Xi. 23 Sidney Place, Minneapolis, Minn. 223 Main Engr. Bldg., Univ. of Minneapolis, Minn. Asst. Engr. International Joint Commission between The U. S. and Canada.	ALPHA
SHEPPARD, CHARLES H. '17 Edwardsville, Ill.	KAPPA
SHICK, HARVEY B. '14 Phi Gamma Delta.	BETA
SHIELDS, CHESTER P. B. S. & E. M. '16 Winona, Mich. Engineer, Winona Copper Co.	BETA
SHREVE, J. DONALD Student '18 White Cloud, Kans.	ZETA
SHRIVER, RAY O. B. S. '17 Tau Beta Pi. Newton, Kansas.	IOTA
SHUEY, ARTHUR F. A. B., B. S., S. B., '16 Delta Kappa Epsilon. 41 W. Beaver St., Jackson, Fla. Sanitary Engineer, Fla. State Board of Health.	ETA
SHUGHART, CHARLES L. Student '18 Tau Beta Pi. Winchester, Kans.	ZETA
SIEKINEN, CHARLES A. '18 1607 E. 2nd St., Duluth, Minn.	ALPHA
SLADE, JOHN P. Student '18 Clay Center, Kans.	ZETA

SIMPSON, JAMES F. B. S. & E. M. '09 Kappa Sigma	BETA
SKAVLEM, HENRY G. E. M. '10 Tau Beta Pi. Care Hollinger Consolidated Gold Mines Co. Timmins, Ontario, Canada. Mining Engineer.	GAMMA
SMEK, GEORGE Student '17 Wa Keeney, Kans.	ZETA
SMITH, ALFRED L. B. S. & E. M. '06	BETA
SMITH, BERT R. Student '17 E. M. Delta Kappa Epsilon. 1053 E. 13th St., Brooklyn, N. Y. Delta Kappa Epsilon House, 608 W. 113th St., N. Y.	THETA
SMITH, CLINTON B. B. A. & E. E. '05 Died July 6, 1913, on Mt. St. Helens, Wash.	ALPHA
SMITH, DONALD C. Student '18 228 Clark St., Menkato, Minn.	ALPHA
SMITH, FRANKLIN M. '14	EPSILON
SMITH, GEORGE D., JR. B. S. '11	EPSILON
SMITH, HUGH A. Student '18 Red Wing, Minn.	ALPHA
SMITH, HARRISON W. A. B. & S. B. '05 Auburndale, Mass. Prof. Mass. Inst. of Tech.	HON. ETA
SMITH, LEWIS B. A. B. & B. S. '11 Kappa Sigma. Box 1418, Butte, Mont. Mining Engineer.	ZETA
SMITH, LYON S. B. '05 77 Bedford St., Boston, Mass. River S. & R. Co., Florence, Colo., Box 597. Assistant Superintendent.	GAMMA
SNEDAKER, EUGENE G. E. M. '14 Kappa Sigma University Club, San Francisco, Calif. 805 Crocker Bldg., San Francisco, Calif. Mining Engineer.	GAMMA

SNEVE, JACK S. M. E. '11 Chi Psi.	ALPHA
SNOW, LESLIE W. A. B. & B. S. '12 8 Story St., Cambridge, Mass. John J. Conner Co., Boston, Mass. Wholesale Grocer.	ETA
SNYDER, EDWARD H. B. S. & E. M. '11 Tau Beta Pi. 923 Brooks Ave., Salt Lake City, Utah. 421 Judge Bldg., Salt Lake City, Utah. Mining Engineer.	BETA
SOMMERVILLE, W. B., JR. Student M. E. '17 Delta Upsilon. 404 Riverside Dr., New York City, N. Y.	THETA
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SPRING, WILLIS W. M. E. '07 Phi Kappa Psi.	ALPHA
SPOWL, NORMAN E. Student B. S. '17 Eta Kappa Nu. 1566 E. 82nd St., Cleveland, Ohio.	DELTA
SPURNEY, EMIL '17 802 Second Ave., Astoria, L. I.	THETA
STACK, CHESTER '17	EPSILON
STALEY, HENRY H. B. S. '14 Sigma Nu Richmond, Kans. Farmer.	ZETA
STANTON, WOLCOTT P. B. S. '12 Delta Kappa Epsilon.	EPSILON
STAPLES, CHEVALIER '08	BETA
STAPLES, CHARBON M. B. S. '11 Sigma Xi, Tau Beta Pi, Phi Beta Kappa. Arizona Copper Co., Ltd., Morenci, Ariz. Chief Cost Accountant, Mining Dept.	EPSILON
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STARRETT, HOWARD M. M. E. '09 Phi Gamma Delta. 31 Rowena St., Detroit, Mich. Packard Motor Car Co. Night Supt. of Truck Division.	ALPHA
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STEINBACH, CHARLES F. '14	BETA
STEINBACH, HARRY P. B. S. & E. M. '06	BETA
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STEVENS, NATHAN H. Student '19 7214 Linwood Ave., Cleveland, Ohio.	DELTA
STICKNEY, ROBERT A. '18 Chi Psi.	ALPHA
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STILWELL, EDWARD H. B. S. & E. M. '11 Tau Beta Pi.	BETA
STONE, CHARLES W. Post Senior '17 Phi Kappa Psi. 4428 Du Pont Ave., S. Minneapolis, Minn.	ALPHA
STONER, OSCAR E. '18 Chester, Neb.	IOTA
STONER, REYNOLD C. B. S. '12 Alpha Tau Omega.	EPSILON
STRAND, CARLYLE H. B. S. '11 Tau Beta Pi. Franklin Hotel, Woodlawn, Pa. Metallurgist, Crown Cork & Seal Co., Baltimore, Md.	DELTA
STRAUCH, DON '18 107 Peoria Ave., Peoria, Ill.	KAPPA
STRIEBING, SIMPSON R. Student B. S. '18 Sigma Alpha Epsilon. 2326 N. 18th St., Waco, Texas.	ETA

STRONG, EARL A. E. M. '14 Sigma Alpha Epsilon.	GAMMA
STRONG, JOHN L. E. M. '08	ALPHA
STRONG, M. ROY. B. S. '12 Sigma Chi, Tau Beta Pi. 9807 Gaylord Ave., Cleveland, Ohio.	DELTA
SULLIVAN, DANIEL C. Student '19 Phi kappa Psi. 618 W. Myrtle St., Stillwater, Minn.	ALPHA
SUMAN, JOHN R. B. S. '12 Delta Upsilon, Tau Beta Pi. 4419 Mount Vernon St., Houston, Texas. Rio Bravo Oil Co., 716 Southern Pacific Bldg. Chief Engineer, Assistant Geologist.	EPSILON
SUTHERLAND, DAVID L. B. S. '14 Chi Psi.	ETA
SUYERKROFF, LEW A. Student '18 Sea Cliff, New York.	BETA
SWAIN, WINTHROP C. A. B., B. S. '13	ETA
SWAN, LEROY A. Student B. S. '17 Sigma Alpha Epsilon. 71 Maple St., Norwich, Conn.	ETA
SWEENEY, WILFRED G. B. S. '06 Miami, Ariz. Miami Copper Co. Construction Engineer.	BETA
SWENSON, GUY A. S. B. '13 Alpha Delta Phi. Concord, N. H. Granite Contracting.	ETA
TALIAFERRO, NICHOLAS L. B. S. '13 Beta Theta Pi, Tau Beta Pi. 2607 Hearst Ave., Berkeley, Calif. Graduate Student Univ. of Calif.	EPSILON
TAYLOR, EDWARD A. B. S. '11 Tau Beta Pi. 9126 Birchdale Ave., Cleveland, Ohio. Research Chemist, The Grasselli Chemical Co.	DELTA

TEETS, CHARLES W. Student '17 Sigma Alpha Epsilon. Newton, Ills.	BETA EX GAMMA
TEMPLIN, ARTHUR W. '16	ZETA
TEMPLIN, RICHARD L. B. S. & M. S. '15 Tau Beta Pi. Minneapolis, Kans. 796 S. Second St., Champaign, Ills. Research Fellow, Eng. Exp. Sta., Univ. of Ill.	ZETA
THIELICKE, CHARLES G. '12	BETA
THIELMANN, THOMAS C. Student '18 Hubbell, Mich.	BETA
THOLEN, CHARLES W. '12 Phi Kappa Psi.	ZETA
THOMAS, J. A., Jr. '15	THETA
THOMAS, LESTER C. E. M. '12 Beta Theta Pi.	GAMMA
THOMAS, WALLACE S.	ETA
THOMPSON, PERCY W. '12 Tau Beta Pi, Sigma Xi.	EPSILON
THOMAS, JAMES E. E. M. '08	BETA
THORNTON, PETER J. Student '19 2200 W. 101st St., Cleveland, Ohio.	DELTA
TICHOENE, HERBERT M. Student '17 E. M. Kappa Beta Phi, Phi Delta Theta. 3080 10th Ave., Mt. Vernon, N. Y. 565 W. 113th St., Mt. Vernon, N. Y.	THETA
TICKELL, FRED G. B. S. '12 Delta Tau Delta.	EPSILON
TIMPELY, WILLIAM D. C. E. '10 Sigma Alpha Epsilon. 1921 Benjamin St., Minneapolis, Minn. Crown Iron Wks. Co., 13th and Tyler St. Estimator and Salesman.	ALPHA
TOLF, FRANK R. '13	EPSILON
TONGUE, WALTER B., Jr. Student '13 Poughkeepsie, N. Y.	GAMMA
TUPPER, OTIS M., Jr. '16	EPSILON

TORRENT, JAMES B. B. S. & E. B. '07 Kappa Sigma.	BETA
TORRANCE, ELIAKIN C. E. '09 Psi Upsilon, Tau Beta Pi.	BETA
TREMBRATH, JAMES B. S. & E. M. '08	BETA
TROFFMAN, GEORGE L. B. S. '10 2723 Broadway, Dormont, Pittsburgh, Pa. Pittsburgh Lamp Brass & Glass Co., Pittsburgh, Pa. Engineer.	DELTA
TRYON, PHILIP D. Student '17 'B. S. Delta Upsilon. 2115 Girard Ave., S. Minneapolis, Minn.	ALPHA
WIDMER, W. E. '15	THETA
TURNBULL, LOUIS A. '17	IOTA
TURNER, HARRY M. B. S. & E. M. '11 Kappa Sigma. Died April 5, 1915.	BETA
TUTHILL, JAMES P. '17 Beta Phi.	KAPPA
UDY, GORDON M. Student '20 434 Maitland St., London, Canada. Theta Tau House, Cleveland, Ohio.	DELTA
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URQUHART, GEORGE K. E. M. '15 Delta Tau Delta. Crosby, Minn. Rogers Brown Ott Co. Mining Engineer.	ALPHA
VAIL, RUDOLPH R. B. S. '10 Delta Tau Delta.	EPSILON
VAN DERLIP, CLYDE L. '17 Sigma Alpha Epsilon. McGill, Nevada. Smelter Experimental Work.	ZETA
VAN DER LECK, LAWRENCE A. B. '15	EPSILON

VAN HOUTEN, EDWIN A. '13 Phi Kappa Psi, Sigma Chi. Died February 6, 1914.	ZETA
VAN HOUTON, HAROLD C. Student '18 615 West St., Topeka, Kans. Theta Tau House, Lawrence, Kans.	ZETA
VAN VALKENBURGH, ROBERT R. B. S. & E. M. '13 Perseverance Mine, Thane, Alaska. Shift boss.	BETA
VARNEY, FRED W. B. S. & E. M. '08	BETA
VAUGHN, FRANCIS E. '12	EPSILON
VAWTER, JAMISON B. S. '16 Sigma Xi. Asst. Eng. G. C. & S. F. Ry., Galveston, Texas. Civil Engineer.	ZETA
VICKERY, MELVILLE W. B. S. '11 Sigma Kappa Phi. 16924 Lake Ave., Lakewood, Ohio. 1028 Engineers Bldg., Cleveland, Ohio. Attorney at Law.	DELTA
VINAL, ELWIN L. E. M. '07	ALPHA
VORCK, CHARLES R. E. M. '16 Chi Psi, Tau Beta Pi. Goodall Bros., Assayers, Helena, Montana. Assayer.	GAMMA EX ALPHA
WAGNER, JOHN E. E. M. & B. S. '08 Helding, Mich. Box 1004 Jerome, Ariz. Assistant Mining Engineer.	BETA
WAGNER, PAGE P. Student '18 Tau Beta Pi. Concordia, Kans.	ZETA
WAGNER, RALPH B. B. S. & E. M. '10 Tau Beta Pi. 225 Hastings St., Grand Rapids, Mich. Forresters' Temple, Saginaw, Mich. General Manager Appleby-Wagner Public Utility Properties.	BETA

WAITHMAN, JOSEPH DEL. B. S. '15 Chi Phi. 316 W. Main St., Grass Valley, Calif. Union Hill Mines, Grass Valley, Calif. Surveyor and Assayer.	EPSILON
WAKEHUT, CAROL J. Student '17 Phi Gamma Delta. 508 South 8th St., Salina, Kans.	ZETA
WALDNER, CLARENCE E. B. S. '15 Selby, Cal. Selby Smelting & Lead Co. Foreman, Sinter Dept.	EPSILON
WALKER, A. W. '17 Alpha Delta Phi.	THETA
WALKER, HARLAN A. '18	THETA
WALKER, STANLEY M. '11 Beta Theta Pi.	GAMMA
WALLACE, CARLETON S. Student E. M. '17 Sigma Chi. 2003 Queen Ave., S., Minneapolis, Minn.	ALPHA
WALLING, BENJAMIN B. E. E. '09 1114 West 25th St., Minneapolis, Minn. Manager Real Estate Dept., Bankers' Trust & Savings Bank.	ALPHA
WALTER, ALBERT U. S. B. '15	Epsilon
WALTON, ALLYN K. Student '19 3050 E. Erie Ave., Lorain, Ohio. Theta Tau House, Cleveland, Ohio.	DELTA
WANVIG, CHESTER O. '12 505 Newberry Blvd., Milwaukee, Wisc. The Wallace & Smith Co., 88 West Water St. General Manager and Secretary.	BETA
WANVIG, JR., JOHN D. B. S. and E. M. '08 Tau Beta Pi. 735 Frederick St., Milwaukee, Wisc. Union Basin Mining Co., Golconda, Ariz. Manager.	BETA
WARD, HOWARD E. Student '19 1875 East 20th St., Cleveland, Ohio.	DELTA

WARD, RICHARD B. S. '13 Sigma Chi.	ZETA
WARREN, JR., ALVAN H. M. E. '08 Psi Upsilon.	ALPHA
WAHNBURN, ELLWOOD G. '16 1137 Washburn Ave., Topeka, Kans. Structural Engr., American Bridge Co., Gary, Ind.	ZETA
WASLEY, WILLIAM A. E. Met. '09 Beta Theta Pi.	GAMMA
WASSON, HAROLD J. E. M. '14 Sigma Alpha Epsilon.	ALPHA
WATSON, GUY P. E. M. and E. Met. '10 Beta Theta Pi.	GAMMA
WEHR, TORREY H. Student E. M. '17 Kappa Beta Phi, Delta Tau Delta. 616 W. 113th St., New York City, N. Y. La Grange Mine, Trinity Co., Weaverville, Cal.	THETA
WEED, STANLEY V. Student '19 Bellevue, Mich.	BETA
WEIMER, EARL J. B. S. '17 Girard, Kans.	IOTA
WEISSEL, GEORGE F. '06 Delta Upsilon.	ALPHA
WEISER, HANLEY '19 Webster Grove, Mo.	IOTA
WELKER, GEORGE E. B. S. and E. M. '09 112 Moran St., Oil City, Pa. Iroquois Natural Gas Co., 311 Iroquois Bldg., Buf- falo, N. Y. Chief Engineer.	BETA
WELKER, THEODORE J. B. S. and E. M. '12 Tau Beta Pi. 867 3rd Ave., Salt Lake City, Utah. Supt., Jardine Gold M. & M. Co., Jardine, Mont.	BETA
WELLS, JR., RALPH E. B. S. '14 Delta Kappa Epsilon.	Epsilon
WENK, RALPH W. B. S. and E. M. '10 Kappa Sigma.	BETA

WENSLEY, ROGER L. E. M. '16 Delta Upsilon.	THETA
WENTZ, WALTER W. B. S. and E. E. '14	ALPHA
WESBROOK, DONALD M. M. E. '10 Chi Psi, Tau Beta Pi, Sigma Xi.	ALPHA
WEST, HAL E. '13 Phi Delta Theta.	ALPHA
WEST, JOHN R. E. M. '10 Beta Theta Pi. 2155 State St., San Diego, Cal. City Engineer's Office. Assistant Engineer.	GAMMA
WESTENHAYER, L. J. '18 4510 Kimball Ave., Chicago, Ill.	KAPPA
WESTERFELT, EDMUND W. A. B. '13 Delta Kappa Epsilon. Ludwig, Nev.	GAMMA
WHEELER, JR., ALDEN D. B. S. '15 Alpha Delta Phi. Bowmanville, Ontario, Canada. Experimental Work, Goodyear Tire & Rubber Co., Canada.	Epsilon
WHEELER, ROBERT M. E. M. '08 Sigma Alpha Epsilon.	GAMMA
WHEELER, WALTER H. E. M. '06 Alpha Delta Phi. American Field Ambulance Service in France. 4215 Dupont Ave., S., Minneapolis, Minn. 1112 Metropolitan Life Bldg. Contracting Engineer, Real Estate and Building.	ALPHA
WHITSEL, RAYMOND V. E. M. '16 Sigma Chi, Tau Beta Pi.	GAMMA
WHITE, CHARLES K. B. S. '13 Delta Tau Delta.	EPSILON
WHITMAN, PERCY G. B. S. and M. S. '11 Phi Gamma Delta. Box 533, Cobalt, Ontario, Canada. Consulting Geologist.	Epsilon

WIGGINS, RALPH R. B. S. and E. M. '14	BETA
Tau Beta Pi.	
Indiana, Pa.	
Rico, Colo., Marmatite Mining and Milling Co.	
Vice-President and Manager.	
WILCOX, ARTEMUS D. B. S. '11	EPSILON
Sigma Phi Epsilon, Tau Beta Pi.	
WILFLEY, ELMER R. '14	GAMMA
Beta Theta Pi.	
WILFLEY, GEORGE E. M. '13	GAMMA
Beta Theta Pi.	
WILKINSON, JOSEPH R. E. M. '14	BETA
Phi Alpha Delta, Tau Beta Pi.	
505 Hickory St., Anaconda, Mont.	
Testing Department, Anaconda Copper Mining Co.	
WILKINSON, PAUL H. B. S. and E. M. '05	BETA
WILLIAMS, EDWARD L. E. M. '14	THETA
Delta Tau Delta, Tau Beta Pi.	
WILLIAMS, WILLIAM H. Student '18	GAMMA
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WILSON, THOMAS R. Student '17	DELTA
92 Windermere St., E., Cleveland, Ohio.	
WILSON, FRANK L. B. S. '12	EPSILON
WILSON, HERBERT L. B. S. '12	ZETA
Sigma Xi.	
Died August, 1913.	
WILSON, WILBUR M. '00	Hon. KAPPA
Tau Beta Pi, Sigma Xi.	
1107 S. Bussey St., Urbana, Ill.	
WINCHELL, JOHN H. Student '17	GAMMA
4285 Federal Blvd., Denver, Colo.	
WING, HOMER W. B. S. and E. M. '08	BETA
WISEMAN, ROBERT C. '14	ETA
Alpha Delta Phi.	
WOOD, ALTON F. Student '19	BETA
Iroquois Hotel, Buffalo, N. Y.	
WOOD, ELY C. E. M. '09	BETA
Died May 21, 1910.	

WOOD, FLETCHER H. Phi Sigma Kappa. Metcalf, Ariz. Arizona Copper Co., Coronado Division. Shift Boss.	GAMMA
WOOD, LUTHER E. Student '19 Iroquois Hotel, Buffalo, N. Y.	BETA
WOOD, ROY U. Met. E. '14 Beta Theta Pi.	THETA
WOODCOCK, EDGAR B. S. '14 Sigma Xi, Lambda Chi Alpha. 1651 Market St., San Francisco, Cal. State Mining Bureau, Ferry Bldg. Determining Mineralogist.	EPSILON
WOODLIEF, HAROLD E. Student '19 218 Huntington Ave., Buffalo, N. Y.	BETA
WOODRICH, OSCAR F. C. E. '08 Sigma Chi.	ALPHA
WOODWORTH, SELIM E. Met. E. '13 Beta Theta Pi.	THETA
WOOLF, JOE H. '14 Sigma Nu.	GAMMA
WORMSER, F. E. E. M. '16 Delta Upsilon. Cornucopia, Ore. Cornucopia Mines Co., or Baker Mines Co. Engineer.	THETA
WORTH, LEE K. Student '17 728 Colorado Ave., Colorado Springs, Colo.	GAMMA
WORTHINGTON, HAROLD A. B. and S. B. '15 Beta Theta Pi, Phi Beta Kappa.	ETA
WORLEY, JR., JAMES A. '17 Delta Sigma Phi. Died October 18, 1916.	IOTA
WORTLEY, RUSSELL B. E. M. and B. S. '13 321 7th St., S., Virginia, Minn. 219 2nd St., S., Virginia, Minn. Mining Engineer.	BETA

WRIGHT, F. S. E. M. '15 Theta Xi, Tau Beta Pi, Sigma Xi.	THETA
WRIGHT, H. H. M. E. '09 Zeta Psi.	ALPHA
WRIGHT, WHITNEY B. '17	EPSILON
WUNDERLICH, MILTON '19	ALPHA
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YOUNG, OLIVER W. B. S. '13	EPSILON
YOUNG, VERTREES S. B. '16 Alpha Delta Phi, Phi Beta Kappa. 374 Delaware Ave., Oakmont, Pa. Aluminum Co. of America. Box 232, Newkensington, Pa. Estimator.	ETA
YOUNG, YEEEL Y. Student '18 Delta Tau Delta. 227 West 5th St., Junction City, Kans.	ZETA
ZIEGLER, VICTOR B. A. and A. M. Golden, Colo. Prof. of Geology.	Hon. GAMMA
ZELNER, OTTO S. B. S. '05 Phi Mu Alpha. 2265 Carter Ave., St. Paul, Minn. 216 Main Engr. Bldg., University of Minnesota. Asst. Prof. of Surveying.	Hon. ALPHA
ZIMMERMAN, STANLEY H. E. M. '15	BETA

The following men, Rhombohedrons, Alumni of the present Beta Chapter, are eligible to Theta Tau, but have not yet been initiated:

COSSAR, GEORGE C.	'06
DOUGLAS, JR., THOMAS J.	'03
JOHNSON, JOHN L.	'04
MERRY, HENRY M.	'07
SPERRY, E. L.	

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