

NEWS-LETTER

UNIVERSITY OF ILLINOIS

Department of Mining and Metallurgical Engineering Alumni

DECEMBER, 1954

Thomas A. Read Becomes New Head

On August 1, 1954, the administration of the department came to the able hands of Thomas A. Read, who was appointed Head after the resignation of Harold L. Walker. In the short time Dr. Read has been with us he has convinced the staff of his ability and sincere interest in all aspects of departmental activity, from the graduate and research program to the undergraduate curriculum and extracurricular affairs. Although Prof. Read's reputation and record are based primarily on his outstanding researches, he is very interested in undergraduate instruction and has assumed the teaching of our introductory physical metallurgy course.

Prof. Read received his undergraduate in physics from the Technische Hochschule, Germany, and Columbia Univ., from which he received his A.B. in 1934. He continued work at Columbia and received his Ph.D. in physics in 1940. His professional career is primarily in research: as a research fellow for Westinghouse studying internal friction of metal crystals; as Head of the Metal Physics Section, Frankfort Arsenal, Philadelphia, from 1941-47; as Principal Physicist for one year at Oak Ridge on radiation damage studies; and in 1948 returned to Columbia as Associate Professor of Metallurgy on a teaching and research appointment.

He has published his work extensively, holding five patents and is author or co-author of 21 papers. The scope of his published work covers such topics as internal friction, plastic properties, season cracking, and structure of sigma phase. More recently, he has become interested in diffusionless phase transformations, and has published with Wechsler and Lieberman a new theory of martensite transformation in the AIME Journal of Metals. He plans to continue this study here at Illinois.

Prof. Read has a very charming wife and eleven-year-old son. With the possible exception of the current football season—even Colum-

Greetings from News-Letter, Professor Read

With apologies for a year's silence, the Newsletter again begins its function of keeping the alumni abreast of activities in the Department. There is much to report in this issue in the way of resignations and new staff, curricular changes, progress in research, and other items of interest which have occurred in the past year.

The past year has been a busy one for us, with extra work brought about by the resignations of Profs. Walker and Hildebrandt, in addition to carrying out the search for new staff. Special tribute should be made to Dr. Chadsey, who served as acting head of the department, and to Prof. Beck, who chairmanned the committee seeking men to fill the staff vacancies.

Many of you were able to meet Prof. Read during the Metals Congress this Fall in Chicago, when over sixty-five alumni and staff

were on hand for the Alumni Luncheon. To the majority, however, who have not yet met Prof. Read, he has consented to direct the following remarks.

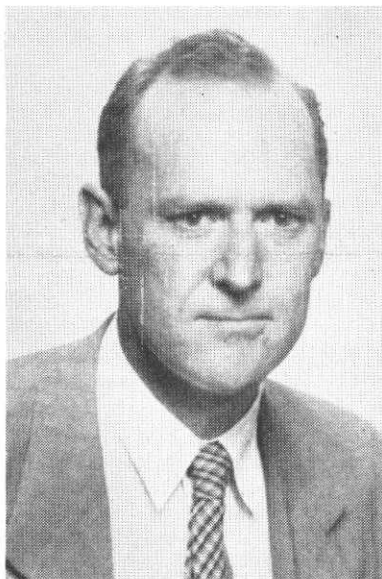
"I am happy to have this opportunity to send my greetings to the alumni. Prospects for a continued healthy growth of the department, particularly in the fields of graduate study and research, appear bright. In the last few months some additional funds for sponsored research and some additional research space have become available. Our major need now is for more students, and alumni can do the department a real service by helping to let prospective students know about the excellent staff and facilities we have here for graduate training in mining and metallurgy.

"I am very happy to be a member of the staff of the University of Illinois, and feel sure that we can look forward with confidence to a continued development of the department during the years ahead."

ENROLLMENT UP SLIGHTLY

Enrollment in the department has shown a small increase over the last year (112 this fall vs. 109 in 1953), however not as great as the overall engineering college enrollment, which now stands near the alltime peak reached after the war. The encouraging part of our enrollment figures is reflected in the large freshman class, 41 this year vs. 29 for the previous year. Large freshman classes are not usual for our department, and with the customary transfers at the junior level, we are anticipating larger graduating classes in the near future.

We are all aware that our field lacks the publicity and glamor that attracts students to other engineering fields, and we appeal to you to use your influence whenever possible to point out the advantages of mining and metallurgy careers to high school and other potential engineering students.



PROF. T. A. READ

bia won one game this year—there is enthusiastic mutual approval between Illinois and the Reads. We all are anticipating continued departmental growth under the leadership of Tom Read.

Professor Walker and Others Have Resigned from Staff

The department lost an able administrator and a good friend when Harold L. Walker resigned as head of the department September 1, 1953. Prof. Walker joined the staff in 1938, became acting head in 1939, and was given full status as head in 1941. Prof. Walker, known better as "Johnny" to most, worked tirelessly for the department, and during his fifteen year tenure was chiefly responsible for our growth in terms of staff, research, budget, and program of instruction.

Johnny joined the M and N Engineering Company, designers and builders of rolling mills for the brass industry. A few months later, we were congratulating Harold on his marriage to the former Violet Fraser Wood, an editorial writer in the University Press. Unable to adjust to the constant travel requirements of his new position, Johnny began a new adventure in education last fall when he accepted a position at the Indian Institute of Science. We are all fascinated with the accounts the Walkers send us of their life in India, but like all people in a foreign land, they would enjoy letters from friends at home. His address now is:

Prof. H. L. Walker
Indian Institute of Science
Bangalore 3, India

JOHN MARX

John Marx left the department in Sept., 1953 to join the research staff of the Phillips Petroleum Company. John is located in Bartlesville, Oklahoma, working on problems associated with oil prospecting and production life of active wells. In his three years at Illinois, John had proved himself an energetic and outstanding research worker, as well as a thoroughly likeable colleague. It was with regret that we saw the Phillips people also recognize these qualities in John. His major field of activity during his time with us concerned elastic properties and plastic and damping properties of metals and other solids.

VAUGHN D. HILDERBANDT

Dr. Hildebrandt resigned as Asst. Prof. of Metallurgical Engineering Feb. 1, 1954 to accept a position as research metallurgist with the Dow Chemical Company. Vaughn is now working in the research labs at Midland, Michigan on problems associated with plastic

deformation of magnesium and its alloys. Vaughn came to Illinois in 1949 after receiving his Ph.D. in metallurgy from Michigan State College. The Hildebrandts regretted leaving their many good friends here and the "dream home" that Vaughn had just completed building, but his new position represents an excellent advancement, and we sincerely wish continued good fortune to the Hildebrandt family.

GEORGE B. CLARK

It was a case of Illinois' loss and Missouri's gain this fall, as Prof. George B. Clark became head of the Mining Engineering Department at Missouri School of Mines. Clark resigned as professor of Mining Engineering after eight years in the department. George was an able and well-liked instructor and devoted himself enthusiastically to research in his field as well as to student interests in the classroom and in extra-curricular projects. George is to be congratulated not only on the distinction of his new position, but also on his marriage this summer in Salt Lake City.

PETER GREENFIELD

Another resignation effective this fall was that of Dr. Peter Greenfield, research associate in Metallurgy. Peter had been with us two years, working on the theory of formation of sigma phase in binary and ternary alloys. The Greenfields are now at MIT, where Peter plans to work a year before returning to his native England. The department keenly feels the loss of an outstanding theoretical metallurgist, as well as its expert on British politics and contract bridge, and staunchest White Sox supporter.

HENRI LAMBOT

Another research associate, Dr. Henri Lambot, resigned this fall to return to Europe after working here for a year. Dr. Lambot is now research professor at the University of Liege, in Belgium where he is studying imperfections in slightly deformed single crystals, and low-angle scattering in the early stages of age hardening. While at Illinois, Dr. Lambot conducted an investigation of disorientations in bent aluminum single crystals using a reflecting monochromatic X-ray beam technique which he had developed.

Metallurgy Curriculum Undergoes Changes

Our undergraduate curriculum is a dynamic program keeping pace with a growing field. Frequent changes are necessary and desirable in order to present students with a firm foundation in physical metallurgy and at the same time keep pace with latest developments in research and practice. We believe you will be interested in current changes, and may be inclined to offer your comments about these and possible future changes.

Pressure to liberalize the engineering curriculum with humanities and liberal arts courses has led the college to require a minimum of 24 hours of non-technical courses in the program. Changes in our curriculum were necessary to meet this requirement and still preserve opportunity for technical electives.

It was decided to make deletions in the time allotted to process metallurgy. Introduction to Metallurgy (150) and Metallurgical Calculations (207) are now dropped from the curriculum. Some of the material in 150 will be assimilated into Electrometallurgy, which will now be four rather than three hours credit. Some calculations will be included in the ferrous and non-ferrous process courses still retained. The elimination of 150 will now permit students to start Introduction to Physical Metallurgy in the fourth semester.

The revised curriculum also omits the second semester of electrical engineering (Applications of Machines) and the advanced course in testing of materials, in order to maintain desired flexibility in the student's program, but may still be taken as electives. The E.E. course has been marginal as far as utility to mets is concerned, and was dropped until a course of greater application (including electronics and instrumentation) is offered.

Another change has been the addition of a course in X-rays for undergraduates. This former deficiency in our program is now being remedied by a very comprehensive three hour course taught by Prof. Lieberman.

The graduate program is also under study, and new courses reflecting the talents of the new staff people as well as the needs of our students are being contemplated.

Current Staff Research Described

A critical part of the department's program is the research conducted by the staff. The reputation of the department and its ability to attract and interest students is based on the quality of the research program as well as the record and accomplishments of its graduates. To keep you abreast of our activities on the campus, a brief report of the current research work of the staff is given here.

MINING

Prof. Chedsey is studying changes in moisture and volatile matter (methane evolution) in coals after mining.

Tommy S. Ullom, a graduate in mining last June is now a research assistant in mining, continuing work started with George Clark last year on infra-red absorption by gases, particularly methane. It is hoped this technique can be developed as a method for detecting methane in mine atmospheres.

McGraw-Hill has recently published Prof. Walter Voskuil's book, "Minerals in World Industry." Walter is now working on a paper "Iron Ores for Atlantic Basin Nations" to be presented to the AIME at the February meeting.

Prof. Witherspoon is investigating, under the auspices of the State Geological Survey, aspects of secondary recovery of crude oil by water floating methods. In this connection, he is also studying the clay mineralogy of Illinois oil sands and the role of the clays in the flow of fluids through these sands. Paul is also studying the physical properties of Illinois crude oils.

Prof. Wuerker is currently conducting investigations regarding distribution curves for heavy media separation of iron ores, tensile strengths of rocks, and tabulation of strength properties of various rocks.

METALLURGY

The new members of the metallurgy staff have been busy preparing the new courses they are teaching, and setting up equipment for their researches. Prof. Read is participating in the studies of Dr. Otte and Dr. Lieberman of diffusionless phase transformations. Dr. Otte is studying the mechanism and crystallographic characteristics of the martensite reaction in steels,

while Dr. Lieberman plans to investigate the kinetics of the transformation and the remarkable ferroelasticity, or rubber-like behavior, of the twinned product phase of the gold-cadmium system.

Prof. Balluffi is currently engaged in the study of radiation damage on metals at liquid helium temperatures, in cooperation with the Physics Department. He is also hoping to start diffusion studies in the near future.

Prof. Marvin Metzger, in addition to teaching the laboratory course in non-ferrous metallography, is studying the lineage structure in aluminum single crystals grown from the melt by the soft-mold technique developed here by Tom Noggle. Examination of the very low angle boundaries etched by an anodic technique previously developed by Marvin may shed light on the behavior of dislocations in relation to the growth of crystals.

The old members of the staff are likewise engaged in various research projects. Prof. Bruckner is continuing his work on mechanical twins in ferrite, with regard to their metallographic registration, recrystallization as evidence of localized slip induced by twin propagation, and the relation of twins to cleavage through a twin-slip-cleavage sequence. Walter is also carrying out work, jointly with the E.E. Department and sponsored by the Commonwealth Edison Co., on cathodic protection of steel structures and of lead sheathed power cable. Walter's book, "Metallurgy of Welding" was published by Pitman last February, and has been adopted by Rensselaer Poly.

Prof. Beck and his graduate students are currently active in two areas of research. One project is the annealing of cold worked metals, including recovery, sub-grain growth, recrystallization, grain growth, and annealing textures, by means of microscopic, electron microscopic, and refined X-ray diffraction methods. Paul's other project is the investigation of the alloying behavior of the transition elements, particularly in regard to the formation of sigma, and other intermediate phases. Phase diagram data, as well as measurements of suitable physical properties are obtained for the various binary

and ternary systems to elucidate the character of the phases.

Three staff members are conducting research in conjunction with their pursuit of the Ph.D. degree. Prof. Bohl is studying the thermodynamic properties of low melting alloy systems, based on emf. measurements made on a cell consisting of pure metal and alloy electrodes. Prof. Eckel is studying the ferritizing rate of pearlitic nodular cast iron. The effect of various prior treatment together with an evaluation of different breakdown cycles is being investigated to determine the economic advantages of various heat treatments. A quantitative determination is also being carried out on the detrimental effect of residual carbide areas on the ductility of the heat treated cast iron. Prof. Ricketts is investigating changes in the sub-grain structure of cold rolled single crystals of aluminum during the recovery stage of annealing. The method involves the use of the electron microscope to examine electrolytically thinned specimens of aluminum foil by electron transmission.

Anthony Kelly is studying the perfection of metal crystals and the changes in this perfection produced by deformation, using the fine beam X-ray technique he has developed.

The current research of Charles Wert and his students involve the application of internal friction techniques to a wide scope of metallurgical problems. Some of these problems include the measurement of diffusion coefficients in substitutional alloys (e.g., 30% alpha brass); phase separation of quenched alloys of gold and nickel; and the magnetic properties of iron containing small amounts of dispersed iron nitrides and carbides. Prof. Wert also is engaged in a long-range project to measure changes in physical properties of metals when they are bombarded with protons, deuterons, and neutrons. An attempt to show the effect of crystal type on the kind of damage has been completed this year. A problem under current investigation is that of measuring the volume change produced at about 10°K by radiation of deuterons from the University cyclotron.

NEW STAFF MEMBERS PRESENTED

In addition to Prof. Read, there have been several other new people added to the departmental staff during the past year.

R. W. BALLUFFI, Research Asst. Prof. of Physical Metallurgy. Balluffi has his bachelor's and doctorate in metallurgy from M.I.T. His industrial experience is primarily in research, having worked at the Naval Research Laboratory in 1947, and at Sylvania Electric from 1950 to 1954. Dr. Balluffi was a member of the scientific staff of Columbia University before coming here this fall. His primary field of interest lies in fundamental studies of diffusion phenomena. Prof. Balluffi's appointment is shared with the Physics Department in their program of radiation damage study. This fall, he also is teaching a course in metallurgical thermodynamics for graduate students. Dr. Balluffi is a member of the AIME and Sigma Xi. The Balluffi's have bought a home in Champaign and hope to become a family of three by the time this reaches your hands.

GEORGE EADIE, Assistant in Mining. George is a graduate of the department (1949), and prior to his return to his alma mater had three years' experience with U. S. Steel as Assistant to Superintendent, Freeman Coal Corp., and from 1952-54 was asst. to General Superintendent, Lone Star Steel Corp., McAlester, Oklahoma. George was an outstanding student here, and we are glad to have him back, now on the other side of the desk in classes in mining engineering. George also is pursuing work on a master's degree in mining.

MARVIN METZGER, Research Assistant Professor of Physical Metallurgy. Prof. Metzger has his A.B., B.S., M.S., and Ph.D. in metallurgy from Columbia, and has three years' experience in industry with Crucible Steel Co. doing research and trouble shooting. He has done work in the past concerning the effect of surface films on creep in cadmium crystals, intergranular corrosion of high purity aluminum, and the effect of heat treatment on internal friction of aluminum crystals. Prof. Metzger claims membership in Sigma Xi, Phi Beta Kappa, AIME, and ASM. Marvin is a champion fencer and a member of the Olympic squad. We are confidently expecting he will be chosen to compete in the 1956 Olympics in his particular division, epee.

HENRY M. OTTE, Research Associate in Physical Metallurgy. Dr. Otte has his B.Sc. and Ph.D. in metallurgy from the Univ. of Birmingham, England. Dr. Otte has been in the country for two years, having been at Case Institute and Columbia Univ. working on the general problem of diffusionless phase transformations, primarily the martensite reaction in steel, and is continuing that research here. Dr. Otte is a member of the Institute of Metals and the Iron and Steel Institute. We felt already acquainted with Henry inasmuch as our last representative from the 49th state, Peter Greenfield, is Henry's brother-in-law.

DAVID S. LIEBERMAN, Assistant Professor of Metallurgical Engineering. Prof. Lieberman received his A.B. in physics from Cornell, and his A.M. and Ph.D. in physics from Columbia Univ. He is the author of several publications concerned with the mechanics and crystallographic characteristics of martensite transformations. He has had experience teaching courses in physics and metallurgy while at Columbia, and now is teaching our course in X-rays. Dr. Lieberman is a member of the American Physical Soc., and Sigma Xi.

FREDERICK D. WRIGHT, Associate Professor of Mining Engineering. Prof. Wright received his B.A. in Min. Geol. from Harvard and his M.S. in Mining Engr. from Columbia. Prof. Wright has visited mining operations extensively in Europe, Africa, and North and South America, and his experience includes work as shift boss in the New Consolidated Goldfields of So. Africa; Mining Engr. and Supt. of pilot mill for Johns-Manville Corp. in New Jersey concerning the milling of asbestos rock; Mining Engr., U. S. Bureau of Mines, where he directed research at USBM's experimental oil-shale mine at Rifle, Colorado; and technical director and Asst. to Gen. Mgr., Cia. Minera Son Martin, in Mexico, a copper, lead, zinc, and silver mine and mill.

PAUL A. WITHERSPOON, Lecturer (1/4 time), Petroleum Production Engineering. Prof. Witherspoon has been on the staff of the Illinois State Geological Survey for three years, although he is new to our staff. He has a B.S. in Petr. Engr. from the Univ. of Pittsburgh, and his M.S. in Petr. Engr. Physics from the Univ. of Kansas. He has

Mining Offers Option In Petroleum Engineering

Beginning this September, an option in petroleum production was offered for the first time by the mining division. This addition was motivated by the fact that each year a good number of graduating seniors in mining engineering entered the petroleum industry for employment in field exploration and petroleum production. For several years this number has varied from one third to one half of our seniors.

The present curriculum for the petroleum option is considered to be a tentative one and is designed to offer the minimum requirements in the subject without offering a new degree. The differences from the mining curriculum are that instead of two courses in geology, five are prescribed in the petroleum option. Instead of courses in mining methods, ore dressing, coal preparation, ventilation, haulage, hoisting, and pumping, the prospective petroleum engineer will take more thorough training in quantitative analysis and physical chemistry preparing him for highly specialized courses in petroleum production and reservoir engineering. The present petroleum option carries a high number of technical elective opportunities to leave room for eventual additions that might appear necessary as we go along. Experience with the option will indicate the direction of future expansion.

Paul A. Witherspoon, petroleum engineer with the Illinois State Geological Survey, has been appointed a part-time lecturer in the department, and teaches the petroleum production courses. We are fortunate to have a man of his ability available, and he has already many plans for improving and expanding the option. Although accurate figures are hard to establish, it is likely that more than half the students enrolled in mining will elect the petroleum option.

eight years' experience as a petroleum engineer with Phillips Petroleum Co., and has held several part-time positions on a consulting basis concerning petroleum production engineering problems. He has had some teaching experience at the Univ. of Kansas, and will teach our courses in Petroleum Engineering.