

UNIVERSITY OF TENNESSEE

Department of Chemistry

Course _____

Instructor _____

Subject Thesis:

The History of Chemistry at U. of T.

Term _____

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Name M. E. Gray

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A T H E S I S

THE HISTORY OF CHEMISTRY AT THE
UNIVERSITY OF TENNESSEE

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RESPECTFULLY SUBMITTED TO THE
FACULTY OF THE UNIVERSITY AS
A PARTIAL FULFILLMENT TOWARD
THE DEGREE OF BACHELOR OF
SCIENCE IN CHEMICAL ENGINEER-
ING.

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MARION E GRAY

Summer Session 1923.

In submitting such a report, the writer is desirous of making it known that he is highly incompetent and incapable of giving a complete and accurate account of all the great things which have been accomplished in the Department of Chemistry at the University of Tennessee. He is only going to have to do with the progress of that department from 1888 until now.

I begin at such a period, first, because I know little of, and furthermore have little chance of finding out just what had taken place up to that time, and, secondly, because it was then and not until then, that things began to take root, and grow; the good sound reputation of the Chemical Department began to build up. I say reputation, for up to that time, it had none, to speak of, in fact what little progress that had been made had arrived at a standstill.

I feel that it would be unjust, in preparing such a paper, if I did not take up at least a few paragraphs upon the man who is more than large responsible for the progress thru which that department has advanced, and the reputation that has been built up around it; in other words, the man who made it what is: Dr. Chas. E. Wait.

Dr. Wait received his higher education from the University of Virginia where he graduated with all the degrees in his course: B.X. C.E. & M.E. later, receiving his Ph.D. there. Afterwards he was honored and recognized by quite a number of scientific societies, chief among which was his election as a Fellow of the Chemical Society of London, a

society which admits very few American Scientists.

Upon leaving the U. of Va. Dr. Wait superintended various mining operations in the southwest. He furnished plans and specifications for reduction furnaces for antimony. Later he was employed as chemist to gold and silver reduction works in California. Then he was elected to Professorships at two different schools, one in his home state, of Professor of Engineering at The Arkansas Industrial University, and the other Professor of Chemistry and Director of the Missouri School of Mines. However, he chose the latter and served in that capacity for eleven years, being the chief instrument in giving this school its high standing among scientific institutions.

From there he came to the University of Tennessee, in 1888, and has remained since, for which I am truly thankful, because without his helpfulness and inspiration, I would have been at loss. And I am sure that these and many other valuable things he has taught will go on with me out in life..As I have said, when Dr. Wait came here, the Department of Chemistry was in sad need of competent man at its helm. It was in need of a building, apparatus and material, and in fact everything that goes to make up a successful department. And being the successful and persistent worker that he was, Dr. Wait soon began and completed the plans for a new building, Science Hall, built in 1889 which still stands and serves in the great capacity as it did upon its erection. Just a simple illustration of the hardships and disadvantages that have had to be contended with. The same identical building, used for

thirty-four long years, not only for chemistry, but for the other sciences in addition, and with a steadily flowing increase of students, the percentage of Chemistry students increasing also, and with no more room than in the very beginning of this period - is it not enough to discourage even the strongest of men? But in spite of all this - this lack of room, and lack of funds to sufficiently equip what he did have, his ideals and ambitions for the school ever being hampered, Dr. Wait has trudged hopefully on and faithfully cherishing the thought that he will some day live to see these ideals realized. In spite of all this, I say that the Department of Chemistry has progressed, and has gained a reputation of being one of the best institutions for Chemistry in the entire South. And the credit for this record is unquestionably due, and I am sure that all the fair minded will concede that it is true, to the untiring efforts of Dr. Wait, who has not only put the Department of Chemistry on the map, but the University of Tennessee!

As to Science Hall, as I have mentioned, it was constructed after Dr. Wait's own plans, after previous experience with similar buildings in Missouri and other places. The original laboratories therein, perhaps the most convenient and complete in the Southern States at that time, are still in use, and although old, they serve the purpose for the second, third and fourth year students. But owing to the huge increases in the freshman classes, the second floor has recently been remodeled, class rooms torn down, and made into two laboratories, both of which are fine, but as usual, not large enough to accomodate the incoming freshmen, without crowding.

The spirit of Dr. Wait's instruction as Professor, the enthusiasm of his students, and the success of their work and investigations in turn, is part of the daily history of the University, which is aiming to deserve a place, for work accomplished by faculty and students, in the forefront of Southern institutions of learning.

Now to get to the main issue of this report. Without a doubt the most outstanding work accomplished by the Chemical Department during its existence is the Nutrition Investigations, or as the U. S. Department of Agriculture Bulletin 29 titles it "Dietary Studies at the University of Tennessee in 1895." That year being only the beginning of such work for it was carried on for fifteen years, under the direction of the U. S. Department of Agriculture with funds appropriated by Congress "to investigate and report upon the nutritive value of the various articles and commodities used for human food."

The University was indeed very fortunate in being one of the few places selected for carrying on this work. Very valuable assistance was rendered Dr. Wait, in the prosecution of the investigations by chemists and others, and due credit will be given them.

The work was divided up into six different bulletins of the Department of Agriculture. The first one, as I have mentioned above, being Bulletin 29 entitled "Dietary Studies at the University of Tennessee in 1895." The studies along this line previously made in the U. S. had been mostly confined to the New England and other Northern States, and in

order that definite information regarding the food supply and consumption of people living under different conditions might be obtained, our University was selected as a representative place at which to make these studies under more particular Southern conditions.

These studies were made of a student's club and a mechanics family, and the amount of food consumed and its composition were determined, as well as the ratio of the tissue forming nutriments to those which more especially yield energy. They were compared with those studies made in New England and elsewhere, and it was found the students in Tennessee, Missouri, and Connecticut ate sufficient food, though there was rather less protein (the tissue forming nutriment) and rather more carbohydrates and fat (the nutriments which yield energy) than the standard called for. The discrepancy was more marked in Tennessee and Missouri than in Connecticut. The Tennessee and Mississippi students it was noted, ate more poultry and eggs, more fat pork and less beef, mutton, and veal than the Connecticut students. Protein is provided in its most available form in meat, milk, and other animal foods. The students in the south obtained considerably more of their protein from vegetable sources than the others.

Those men assisting Dr. Wait in this series of experiments were Mr. H. M. Smith, of Middleton, Conn., and Messrs. C. A. Mooers, J. A. McDonough, C. O. Hill, and J. O. La Bach of Knoxville. The general plan of their investigations included an account of all food materials of nutritive value in

the house at the beginning, and purchased during, and that which remained at the end of the experiment. In addition, all kitchen and table wastes of the food were collected, taken to the laboratory and there weighed and analyzed. The amount of different food materials on hand at the beginning and received during the experiment were added; from this sum the amounts remaining at the end were subtracted. This gave the amount of each material actually used. From the amounts thus obtained and the composition of each material as shown by analysis, the amounts of the nutritive ingredients were estimated. From this again were subtracted the amounts of nutriment in the waste, thus the amounts of nutrients in the food actually eaten were learned. An account was kept of all meals from which was calculated the equivalent number of meals for one man.

Owing to lack of time and space, I will not treat here with the details of these experiments but will pass on to the other main points of this government work, after stating the main thing learned from these previous experiments: that what was needed was to use foods better adapted to the needs of the body, in other words, those containing more protein.

Then there was next Bulletin 53 gotten out in 1896 and 97, which was entitled "Nutrition Investigations" and treated with (1) studies of the composition of different kinds of meat, including analyses of a side of native Tennessee beef divided into seventeen cuts according to the usages of the Knox-

ville market, of a side of Tennessee mutton divided into six cuts, and of twenty Tennessee chickens as purchased in the open market; (2) dietary studies including two mechanics' families living in Knoxville and two college clubs; and (3), twenty-one digestion experiments with healthy men. In connection with the latter the balance of income and outgo of nitrogen was also determined.

Next Bulletin 89 was issued entitled "Experiments on the Effect of Muscular Work Upon the Digestibility of Food and the Metabolism of Nitrogen" conducted from 1897-99, in which Dr. Wait was assisted by Messrs. C.O. Hill, C. A. Mooers, W. H. Gildersleeve and W. K. Hunter. They included sixteen experiments, each with one exception, divided into three periods. During two periods the subject had little or no muscular work and during the third he had more or less active muscular exercise. The central idea of the investigation was to conduct an experiment with a subject in approximate nitrogen equilibrium in which a period of work was preceded by a period of rest, the diet remaining the same, except that during the work period, material was added presumably sufficient in amount to increase the fuel value more than enough to compensate for the energy expended in muscular work performed. It was also believed that the experimental conditions were such that the effect of muscular work upon digestibility could be studied; that is, it could be ascertained whether a man digests the same amount from a given diet when at rest as when at work, or whether the digestibility is increased or diminished.

Then Bulletin No. 117 was issued with exactly the same title as the preceding one and which was a continuation of the same sort of experiments and occupied the time of Dr. Wait and his assistants, Messrs C. O. Hill, W. K. Hunter, C. A. Mooers, and C. G. Schenk, from 1899 - 1900.

The work done from 1901 - 1905 is described in Bulletin 187 entitled "The Digestibility and Nutritive Value of Tegumes", which was translated and published by a French scientific society, which goes to show its value, as to merit its publication and use in a foreign country. This bulletin reports seventy-two experiments, all of which were carried on here at the University under the supervision of Dr. Wait who had as his assistants the aforementioned, in addition to T. M. Powell, and W. H. Brown. The experiments were made for the purpose of studying the digestibility of red kidney beans, white navy beans, and three varieties of cowpeas, namely, whippoorwill peas, Clay peas, and Lady peas. The results obtained with the cowpeas were particularly interesting, as they show that this typical southern legume has very much the same nutritive value as the better known varieties of beans. The legumes were eaten in combination with other food materials, both animal and vegetable, and the digestibility of the diet as a whole was ascertained. In all these experiments the heats of combustion of the various foods were also made.

The last and most important division of the government work is described in detail in Bulletin 221 entitled "Dietary Studies in Rural Regions" which extended thru a period

from 1904 - 1909 and the work carried on in conjunction with those of two other states, Vermont and Georgia. Dr. Wait's chief cooperation came from Prof. C. O. Hill, who has also been a very important factor in the development of the Chemical Department of the University for a number of years. Prof. Hill came here from Michigan many years ago and has ever since been putting his whole heart and soul into the University, and has always been very highly thought of by students with whom he came in contact, and likewise members of the faculty. In this particular phase of the government work he rendered great service in the analytical work, as well as conducting the dietaries.

The general plan of these studies the last of the series of similar character, was that followed in the family dietaries already reported. It consisted in ascertaining the weight, composition, and cost of all the food used by these typical mountain families of East Tennessee during the assigned period, and the number of meals served. The waste was also collected and analyzed. The amount of nutrients supplied by each class of food materials and by the total food were then calculated from these data.

This government work caused the University and the department especially and wide range of fame and Dr. Wait received numerous congratulations and his work was the subject of editorials in many newspapers. In fact, the recognition of its value to the scientific world was even recognized in far away France, as I have mentioned.

The design and Construction and installation

of Convenient Still for the Laboratory was another one of important advances made by the department, which was completed in 1895. In the designing of this still there was two main objects in view. First, the utilizing of steam from the large sixty horsepower boiler used in heating the building; and, second, a provision for making distilled water with gas, when steam from the heating plant was not available. The still was encased in wrought iron, with an asbestos lining, and was provided with a float which automatically regulated the flow of water from the supply pipe. It was a beautiful piece of apparatus, and the workmanship was excellent in every detail. The capacity of this apparatus when the steam from the boiler was used water could be distilled at the rate of 112 gallons per day, while when gas had to be depended upon only 26 gallons per day was yielded. The still has well proven its worth, for it still stands today, having been used for that purpose ever since its erection.

Then there are several things that have been accomplished by the department, though of lesser importance, all go on to show the strides that were made.

These things all help to prove the statement in the beginning that "Tennessee was rapidly coming to the forefront in Southern institutions of learning."

Numerous processes for analysis have been worked out in addition to the countless old ones that have been revised. There was the scheme for "The Oxidation of Silver" which grew out of the trouble that a western smelting and refining company had had, and sent their worries here to be

worked out. Not only did surrounding industries and mining concerns depend upon the University for aid in solving such problems, but they came from all over the country.

Much work was done with titanium, and discoveries made about that element which had, up to that time, escaped the attention of other chemists. Many analyses with accompanying tables were made, and it was found that titanium existed in every plant ash, in some form, that was considered, contrary to the original belief that "it does not appear to form part of the animal or vegetable kingdom."

Another apparatus, which was gotten out in 1890 and might be mentioned here, was that "For the Decomposition of Water and the Subsequent Explosion of Mixed Gases." It consisted of passing an electric current thru acidified water in large glass jars, the mixed gases, hydrogen and oxygen were liberated, collected in vessels, thence to a collodion balloon, and then exploded by an electric spark.

Then came the gas generator which was constructed for use in the laboratory, for either carbon dioxide, hydrogen sulphide, or hydrogen. It eliminated the objectionable features which previous generators had offered, chiefly, a movable cork or stopper, fitted to the generating vessel thru which passed a delivery tube with stopcock. Owing to the loosening of the stopper by repeated use, a slow escape of gas occurred which would have in time exhausted the generator. The salient features about the piece of apparatus were: its gas tight reservoir, its unusually large generating tube, and

simplicity of its parts which enabled the generator to be taken apart, cleaned and recharged with considerable ease.

In addition to the great nutrition work done for the government, there are a number of other important investigations and studies which have been carried on, for various concerns, and also upon a variety of subjects. It is with great regret that I have not been able to secure any of the articles which were published on these investigations, so that I am not prepared to give a complete and accurate account of just what they were, but as it is I can only mention them. They include the following:-

"The Analysis of 276 Samples of Foliage From Trees, (taken from the territory in a radius of 25 miles around near Ducktown, Tenn., Incident to the Suit Between Georgia and The Tennessee Copper Company in the U. S. Supreme Court".

"The Analysis, and Study of Pig Iron in the Keneval Desulphurizing Process."

"The Occurrence of Titanium in the Animal Kingdom."

"Which was a separate paper from "Titanium in the Vegetable Kingdom" about which I mentioned).

"Some Calorimetric Accessories."

"On the Use of Cotton Seed Meal, as a Food for Man with Coefficients of Digestibility, and Nutritive Value."

It might be well to include in this report some records of the work done by the students in Chemistry during their stay at the University, in that it would show the courses

offered in Chemistry. To show this, a brief summary of the actual work done by Mr. Edward F. Kern, B.S. in Ch.E., 1897 and graduate student of Chemistry 1898 at the University of Tennessee and Ph.D. at Columbia University, and by the way now holds the office of Professor of Mining and Metallurgy at the latter school.

A. General Chemistry: First year of lectures recitations and frequent quizzes, on laws of Chemical Combination, the occurrence, preparation and properties of common elements, and numerous problems of chemical equations, etc.

B. Qualitative Analysis.

1. Study of the blowpipe tests for the more common elements.
 2. Study of special tests for the acids, ammonia salts and organic bodies.
 3. Study of reactions of the common metals, their separation into groups.
 4. Study of the detection of the commonly occurring acids.
 5. Study of the solution and behavior of bodies in water and the common acids.
 6. Analysis of commercial alloys.
 7. Analysis of salts for bases and acids.
- II. Quantitative Analysis, which course included the analysis of 21 different substances.
- III. Gas Analysis.

IV. Food Analysis: (Many of the students gained much knowledge of this in the Nutrition work, especially the graduate students.

V. Fire Assay. Assays of gold and silver ores.

VI Original Investigation.

VII.Determinative Mineralogy. Identification of minerals.

VIII. Spectrum Analysis. Determinating the various elements in minerals by their spectrum.

IX. Parallel Reading.

C. Chemical Technology. A study of the chemical industries.

D. Metallurgy.

This record was printed in 1899, and naturally some of the work given then has been dropped out of the present day courses, giving way to the newer and more advanced ones. One great addition was the taking up of Organic Chemistry, which department has been very ably handled by Prof. C. O. Hill. The need for Organic Chemistry is more and more becoming pronounced in the scientific and industrial world, and as no one on the Chemistry staff has endeavored to keep up with the times more than Prof. Hill, this branch has been of great value, and has progressed wonderfully, in spite of the ever present "lack of funds."

With some difficulty, the department has just recently made one more great advance, namely, in the introduction of "Physical" or "Theoretical Chemistry" to the curriculum,

under the direction of Dr. J. K. Robinson.

It will no doubt be noted that the writer of this report has not gone into detail regarding these different investigations, but it has been more his purpose to bring about these points in a general way, and to treat them more as incidents in the history of the development and advance of that part of the University, and not as a source of definite scientific information for anyone, unless it is the writer. Further, it might be suspected that he has shown only the bright side, and tried to make out that the Chemical Department is greater than it really is, but his intention has been more to show the important things that have been accomplished, and the possibilities for great things that there are. With Drs. Wait and Hill and their helpers, in charge, had they only the funds to do with.

In addition to the aforementioned, as suggested by Dr. Wait, I think it well to include in this history, a brief account of the lives of the students of Chemistry at the University, who have gone out into the world and have pursued Chemistry as their life work. Some, it will be found below, have not followed it to the letter, but it will also be noted, that if they haven't they are following subjects directly or indirectly connected with it. As to the veracity of these following statements, and likewise as to their "up-to-date-ness" I cannot strictly vouch for. Some of them may have changed places since this data was collected, and hence the exact accuracy of their whereabouts and positions may be lacking to a certain extent. However, I have tried to secure true and up-to-date

reports, and if errors are found it is because the latest information was not to be had.

And again, some might have been left out entirely, but if so it is either because their names were not on the roll books of Dr. Wait, or because they never did take up Chemistry as a vocation, and hence it would not be of any special importance to mention them here.

So then, below is a list of practically all the graduates of the Chemical Department, either with a B.A. or a B.S. degree, from 1893 until now, and a brief account of themselves.

George E. Dodge, Tuscon, Ariz. B.S. '93.

Received his M.D. from the U. of Va.

Practising physician and surgeon in New York City, '98-08.

Practising physician and surgeon in Tuscon '12 until now.

Dr. Marion Dorsett, Washington, D.C. B.S. '93.

Received his M.D. from Columbia University

Demonstrator of Pathology at Columbia University '01.

Asst. Chemist U.S. Dept. of Agriculture '94-04.

Chief Chemist U.S. Dept of Agriculture '04 -

C. A. Mooers, Knoxville, Tenn. B.S. '93.

Asst. Chemist. Agricultural Experiment Sta. U.T.

Chemist Agricultural Experiment Sta. Calhous, La.

Now Vice-Director and Agronomist at U.T.

Wm. H. Gildersleeve, Johnson City, Tenn. B.A. '97.

Asst. Chemist of a Tanning Company there and
later General Superintendent of that company.

W. E. Grainger, Knoxville, Tenn. B.X. '97.

Circulation Manager of Knoxville Sentinel.

2nd Lt. in U.S.A. during Spanish American War.

Chemist at Cranberry Mines, Johnson City.

Chemist at Tennessee Copper Co., Ducktown.

Now Instructor in Chemistry at U. T. Also a
commercial and analytical chemist and consult-
ing chemist for various concerns.

W. K. Hunter, Knoxville, Tenn. B.S. '98.

Was Flotation expert for American Zinc Co.
mines at Mascot.

Acted in same capacity for Tennessee Copper Co.
of Ducktown.

Chemist and Metallurgist.

Ed F. Kern, c/o School of Mines, Columbia University, N.Y.
City. B.S. '97.

Received Ph. D. from U. of Pa. and Columbia '01.

Supt. of Lead Refining in British Columbia '02-03

Research and Consulting Chemist Betts Lab.

Troy, N. Y. '03-05

Professor of Metallurgy and Electro-metallurgy
in School of Mines of Columbia University and
Supervisor of all Tests, Consultation and Re-

searches Member of American Electrochemical
Society and American Inst. of Mining Eng. '05-
to date.

Allen James Greer, B.A. '98

Colonel in U. S. Army

Served in A.E.F.

Now at Camp Dix, N.J.

Samuel G. Spiro, Cleveland Ohio, B.S. '00.

Followed Chemistry for first two years serving
in Chicago, and Middlesboro, Ky. 00-02.

Salesman out of Knoxville '02-14.

Executive, being Sec.Treas. of Rex Bros. Co.,
of Cleveland, O. '14-to date.

J. W. Slocum, Chicago, Ill. B.A. '01.

Chemist Chicago Chrome Works - '01-02.

Chemist Armour Refining Co., Chicago, '02-03

Chemist Armour Soap Works, Chicago, '03-04

Chief Chemist 31st Plant of Armour, Chicago '04-06

Mfg. Chemist Allen B. Wrigley Co. Chicago, '06-12

Vice-Pres. & Gen. Mgr. Wetlin Chem. Co. " '12-14.

Director of Chemical Research in Far East for
U.S. Rubber To. '14-19

Asst. Instructor in Chemistry at Columbia Univ-
ersity '19 - to date.

W.M. Fulton, Knoxville, Ten. M.S. '01.

President of W.M. Fulton Co.

President of W.M. Fulton Co.

Manufacturer and Inventor and a very valuable man to this community. Was of great service to his country during the Great War as an inventor.

Henry F. Easter, El Paso, Tex. B.S. '02.

Chemist El Paso Smelting Wks. '04-09.

Asst.Supt. El Paso Smelting Wks. '09-17

Supt. El Paso Smelting Wks. and also of their refining Plant at Hayden Ariz. '17-22.

And was Consulting Metallurgist working for this company in various parts of the west '21-to date.

Frank Brockman, B.S. '02.

Now in Korea engaged in Y.M.C.A. work.

John Logan, B.S. '01.

Druggist in Knoxville. '01- 09.

Machinery Salesman since '09.

T. N. Powell, New York, N.Y. B.S. '02.

With General Chemical Co. of that City.

W. H. Brown, Bessemer, Ala. B.S. '03.

Blast Furnace chemist at Johnson City. for a while. Now in same work at one of the steel plants at Bessemer.

P. H. Cornich, New York City, N. Y. B.S. '03.

Chemist and Assayer in Texas and Mexico '04-08.

In newspaper work in Nevada and Arizona 15-16

Captain in U. S. Army during the War.

Field Investigator of Municipal Surveys for
Bureau of Municipal Research, New York City, '19.
Asst. Mgr. Hoboken Chamber of Commerce, '20-21.
Staff Member Bureau of Municipal Research, New
York City, '21 -- to date.

H. H. Hampton, B.S. '03.

Graduated with M. D. degree from John Hopkins
in 14. Resident Gynecologist to John Hopkins
Hospital '19- to date.

W. O. Johnston, B. S. in Pharmacy '03.

Captain in U. S. Army during the War.
Now in retail drug business in this City.

C. P. Smith, Knoxville, Tenn. B. S. '03.
Now President of J. Allen Smith Co.
Merchant Millers of this City

Miss Dell Smith, Johnson City, Tenn. B.S. '03.
Has been teacher of Chemistry in various places,
Ga., Ark. and Ore.
Now teacher of Chemistry at East Tennessee
State Normal School, Johnson City.

C. J. McClung, Knoxville, Tenn. B.A. '05.
Now Vice-President of C.M. McClung Co. of this
City.

Matt G. Thomas, Knoxville, Tenn., B.A. '05.
Attended Philadelphia Textile School where he

received training which enabled him to become President of the Cherokee Spinning Mills of this City, which position he now holds.

Miss Harriet Greve, Knoxville, Tenn. B.A. '06.

Taught at Chattanooga High School '06-09.

Taught at Chattanooga Central High School '09-12- and 15-18.

Taught at College for Women at Columbia S.C. 13-15
Director of Farnold Summer Sessions and one winter session at Columbia University, N.Y. '18-21
Now Dean of Women at University of Tennessee.

Frank Morrell, Lenoir City, Tenn. B.S. '06.

Prescriptionist and chemist at various places '09-18.

Chemist for Lenoir City Car Works of the Southern Railway '18 to date.

J. C. Rhea, Holland, Mich. B.S. '09.

Now Assistant Sales Manager of Depree Chemical Co. of that city.

A. Wersenberg, B.S. in Mining Eng. '09.

Was engaged in mining engineering work in South America, Mexico, U.S. and in Canada for a number of years.

Now President of Standard Crown Co., Philadelphia.

J. C. Jackson, B.S. '10.

Received his M.D. from Vanderbilt University and is now a practicing physician.

S. T. Weaver. B.S. in Ch. E. '11.

Chemist for American Water Works & Elec. Co. 11-15
Now Vice-Pres. of W.J. Savage Co. of this City.

J. W. Love, B. S. in Met. Eng. '11.

Was engaged in Mining and metallurgical work
in Utah, Arizona, Tenn. and Montana for a number
of years.

In U. S. Army during World War. and there is no
report of him since.

S. W. Donaldson, B. A. '12.

Received his M.D. from U. of Mich. and was
connected as an instructor in the Medical Dept.
of that University from 12-16. Was at German
Hospital in N.Y.C. in '16. and rose to the
rank of Major in the U.S. Army Medical Corps
during the War.

Now he is an instructor in Roentgenology at
the University Hospital of U. of Mich, Ann Harbor.

R.L. McGuire. B.S. In Ch. E. '13.

Examiner of Survey U.S. Forest Service 13-14
Chemist in Chattanooga '15.

By product coke plant operator at Youngstown
and Stuebenville, Ohio, 17-22.

Now with North Carolina State Highway at Franklin
North Carolina.

R. M. Murray, B.S. in Ch. E. '13.

Draftsman for Southern Engine & Boiler Wks,
Jackson, Tenn. 13-15.

Now in Engineering work with Oliver Iron Mining
Co. of Duluth, Minn.

J. H. Gilbreath, B.S. in Ch. E. 14.

Was engaged in geological surveying, prospect-
ing and mining at Mascot, 14-17. Now a captain
in U. S. Army.

S. B. Hayley B.S. in Ch. E. '14.

Chemist for Sheffield Iron and Coal Co. 14-21
Chemist for T.C. & I. Railroad of Birmingham
from '21 to date.

H. E. Copeland B. S. '14.

Metallurgical engineering at Lenoir City 14-19
Chemist and metallurgist for various concerns.
Now Asst. Supt. of Foundries at Lenoir City Car
Works.

Paul Logue. B.A. '16.

Chemist at Kingsport, Tenn. 16-17.
Chemist at Burrage, Mass. 17-19
Supt. of a chemical plant at Charleston W.Va.
19-20
Now operating chemist at Newington, N.H.

Geo. S. Bratton B. A. '16.

Chemist for U. S. Alloy Steel Co. 16-17
Army Chemist 17-19.
In chemical Research work at Mellan Inst. '22.

and following the same with Liberty Yeast Corp
to date.

A. F. Roller

B.S. 17.

Taught in Philadelphia, Pa. 12-14

Instructor at Georgia Tech 18-19

Now head of Science Dept. Raleigh High School NC

E. S. Freed

B.S. in Ch. E. 12.

Now with Guggenheim Bros. New York City and is
working for that concern in Chile.

Robt. L. Bibee

B.S. in Ch. E. 18.

U. S. Army 18-19

Now Oil dispatcher and Geologist in Tampico, Mex.

Wm. L. Chandler. B.S. Ch. E. '20.

Is at the head of the Experimental Laboratories
of the W.M. Fulton Co., of this City.

H. W. Patton

B. A. 20

Is now studying medicine at the U. of Va.

C. F. Sexton

B.S. 20

Is with the Aluminum Co. of America at Alcoa, Tenn

Geo. W. Reagan

B.S. 20

Is the City Engineer of Knoxville.

E. G. McConnell

B. A. 21

Was chemist for city water works of Knoxville
21-23

Now holds a similar position in Charlotte, N.C.

C. C. Wilson

B.S. in Ch. E. 22.

Has been with The Enterprise Foundry and Machine

Co. of Bristol, Tenn. since finishing school in the capacity of draftsman. But he is also superintending the construction of a chemical laboratory for that firm, of which he is to be in charge.

W. H. Mathews

B. S. in Ch. E. 22.

Is chemist at Ducktown Tenn. for the British Sulphuric acid plant there.

J. J. Quinn

B. S. in Ch. E. 23.

Is chemist for city Water Works of Knoxville having succeeded Mr. McConnell in that capacity.

Wm. A. Simkins

B. S. in Ch. E. '23 is with the Tennessee Eastman Corporation of Kingsport, Tenn. with whom the author of these statistics hopes to be as soon as this session is over.

Marion Eugene Gray.