

# CROSS REFERENCE SHEET

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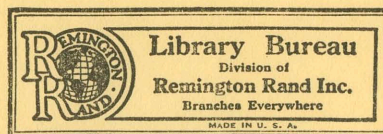
Name or Subject

File No.

Smith, Alex

Stieglitz, Julius

File cross reference form under name or subject at top of the sheet and by the latest date of papers. Describe matter for identification purposes. The papers, themselves should be filed under name or subject after "SEE."



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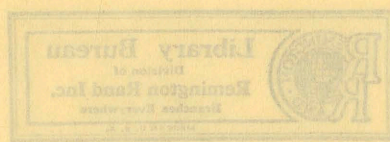
# CROSS REFERENCE SHEET

Regarding \_\_\_\_\_  
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Name or Subject \_\_\_\_\_  
 File No. \_\_\_\_\_

Smith, Alex  
 Stieglitz, Julius



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~~Report of Director of Ryerson Physical Laboratory~~

The Ryerson Physical Laboratory  
to the President of the University <sup>Chicago</sup>  
Sir: I submit herewith my report ~~on~~ the work of the Ryerson Physical Laboratory

✓ ~~from~~ <sup>October</sup> 1892

January 1894  
until ~~Jan~~ 94.

JAE  
RYERSON  
LABORATORY

the Physical Laboratory was located in temporary quarters in the corner of <sup>Forty fifth</sup> ~~55th~~ St and Lexington Ave. During the first year <sup>of this</sup> ~~months of this time~~ the director was ~~at~~ carrying out the ~~work~~ <sup>con</sup> ~~employed by the~~ in the ~~in~~ <sup>leave</sup> of absence for the purpose of superintending ~~the~~ an investigation carried out under the ~~the~~ <sup>authorisation</sup> by the <sup>International</sup> Committee <sup>of</sup> ~~measures~~ <sup>measures</sup>. During this time ~~however~~ Mr. S. W. Stratton however ~~the~~ Ryerson Physical Laboratory was founded and by correspondence and with the assistance of ~~Prof~~ <sup>Mr</sup> S. W. Stratton



the plans were worked out in detail.  
 The actual construction was superintended  
 by ~~Prof.~~<sup>Mr.</sup> Stratton and to his ~~zealous~~  
~~efficiency~~ and conscientious supervision  
 the efficiency of the ~~resulting~~ Laboratory  
 is largely due.

The building was completed ~~and~~<sup>and</sup>  
~~dedicated~~ on

~~and on the~~

the Department was formally installed  
 in its new quarters, <sup>Jan 1st 1894.</sup> After six years  
 of trial it has been found to answer  
 admirably all requirements and has  
 received favorable comment from  
 Eminent Physicists ~~both~~ of this country  
 and from abroad. Perhaps the  
 only serious criticism was that which



Chicago

Concerned the placing of the Engines  
Dynamoes and Workshop in the building.

The original plan contemplated  
a separate two story building to the  
North of the Laboratory - which was to  
be devoted to this purpose; but it was  
decided that a Central Lighting and Heating  
Station, which was proposed ~~about~~ <sup>at</sup> this  
time, would make the additional  
building unnecessary.

During the first three years  
the third floor (with the exception of  
the General Laboratory at the East End)  
was used <sup>as temporary</sup> ~~for the~~ quarters for other



Departments, much to their own regret  
 as well as the inconvenience of the  
~~a~~ <sup>Department</sup> of Physics. Of these the  
~~a~~ <sup>Department</sup> of Mathematics and ~~the~~ Astronomy  
 still remain. At present there is  
 no serious inconvenience on this account,  
 but it is hoped that in preparing for  
 future needs the Department of Physics  
 may be able to count upon the  
 exclusive occupancy of its building.

The equipment of the Laboratory  
 and the stock of apparatus and appliances  
 compare favorably with that in those  
 of ~~one~~ other institutions and <sup>are</sup> ~~is~~ much  
 more complete than the average.  
 The apparatus has been selected  
 with care, and ~~quite~~ in ~~most~~



Chicago

such a way as to combine as far as possible its usefulness for demonstration ~~suit~~ and for research. In this

connection ~~it~~ ~~on~~ the workshop has proved of immense service. ~~and~~ Many pieces of apparatus which it has supplied ~~would~~ have needed ~~pages~~ been made for one half the cost required if ordered from the makers; and, the construction being superintended by the men who are to use them, insures their efficiency.

Until recently the Department has been allowed two mechanics; and has had no difficulty in finding



work, more than sufficient to keep them occupied. ~~and~~ It is hoped that the administration may find a way to ~~continue~~ ~~restore the~~ enable the Department to ~~restore this~~ ~~continue~~ employ both men.

see  
in  
the P.

The Department has <sup>furnished four candidates for the degree</sup> ~~conferred the degree~~ of <sup>Doctor of Philosophy</sup> ~~P.D.~~ upon the following candidates:-

Gordon F. Hull 1897

Isabelle Stone 1899

Edwin S. Johnson 18 98

Henry Gordon Gale 18 99.

The following <sup>is a list of publications</sup> ~~articles have been~~ ~~published~~ by members of the Department <sup>above named</sup> and by the ~~candidates above named~~



A. Michelson.

Chicago

- 1 "Les Méthodes Interférentielles en Métrologie  
et l'établissement d'une longueur d'onde  
comme unité absolue de longueur."

Rev. Gen. des sciences 30 Jan 1893

Translation in Nature Nov 16 1893

Abstracts in Comptes Rendus and

Doc. de Physique.

A. Michelson

- 2 Determination expérimentale de la valeur  
du mètre en longueur d'ondes lumineuses

Travaux et Mémoires du Bureau International  
des Poids et Mesures. 1895 Vol. II

A. Michelson

- 3 "On the broadening of spectral lines by  
temperature and pressure."

Astrophysical Journal Nov 1895.

A. Michelson

- 4 "On the conditions which affect the spectrum  
photography of the sun."

Ibid Jan. 1895



A.A. Michelson

#7 "On the limit of visibility of fine lines in a telescope."

Ibid. June 1895.

R.A. Millikan

9 "Eine Experimentelle Bestätigung der Clausius-Massotischen Formeln."

Wiedemanns Annalen Feb. 1897.

A.A. Michelson

12 "The relative motion of the earth and the ether".  
Am. Jour. Sci. Vol III 1897.

A.A. Michelson

13 "Radiation in a magnetic field."  
Phil. Mag. 1897

Isabelle Stone

14 "Electric ~~resistance~~ resistance of thin films"  
Phys. Rev. Jan 1898.

15 A.A. Michelson and  
S.W. Stratton

"A new harmonic analyser"  
Am. Jour. Sci. Vol V. Jan. 1898



Chicago

A. A. Michelson

- 14 "A spectroscope without Prisms or Gratings"  
Am. Jour. Sci Vol V March 1898.

A. A. Michelson

- 16 "Radiation in a magnetic field"  
Astrophysical Journal Vol VII Feb. 1898.

A. A. Michelson

- 18 "The Echelon spectroscope"  
Ibid Vol VII. June 1898.

C. R. Mann

- 19 "A note on Michelson's echelon  
spectroscope"  
Science Aug 1898.

G. F. Hull

- 20 "Use of the interferometer in the study of  
electric waves"  
Phys. Rev. Oct 1897.



E. S. Johannott

21 "Thickness of the black spot in liquid films"  
Phil. Mag. June 1899.

A. A. Michelson

22 "Nouvelle methode de tracer et d'observer  
des divisions de precision formees par  
des traits lumineux sur fond noir"  
Trav. et Mem. Bur. Int. des Poids et Mesures 1899.

A. Gale

23 On the relation between density and index  
of refraction of gases.  
Not yet published.

~~A College course of laboratory experiments  
in general physics~~

Str. Stratton and

24 R. A. Millikan

A College course of laboratory experiments  
in general physics.  
Text book.



7. L. O. Wadsworth

4 The Modern Spectroscope x  
General Considerations Respecting the Design of  
Astronomical Spectroscopes. (Astro-Phy. Jour. Jan. 1895)

~~7. L. O. Wadsworth~~

The Modern Spectroscope xi

Some new designs of Combined Grating and  
Prismatic Spectroscopes of the Fixed Arm Type, and  
a new form of Objective Prism. (Astro-Phy. Jour. March 1895)

~~7. L. O. Wadsworth~~

The Modern Spectroscope xiii

"A multiple Transmission Prism of  
Great Resolving Power." (Astro-Phy. Jour. Nov. 1895)

~~7. L. O. Wadsworth~~

The Modern Spectroscope xiv

"Fixed Arm Concave Grating Spectroscopes"  
(Astro-Phy. Journal Dec. 1895)

The Modern Spectroscope xv

(Astro-Phy. Journal, Jan. 1896)

The Modern Spectroscope xvi

A simple optical device for completely  
isolating or cutting out any desired portion of  
the Diffraction Spectrum, and some further notes on Astronomical Spectroscopes  
(Astro-Phy. Jour. March 1896)



F. L. O. Woodworth

The Modern Spectroscope x

General considerations respecting the design of  
astronomical spectroscopes. (Astro-Phys. Jour. 1882)

The Modern Spectroscope xi

Have now designs of combined grating and  
prismatic spectroscopes of the fixed grating type, and  
a new form of objective prism. (Astro-Phys. Jour. March 1882)

~~F. L. O. Woodworth~~  
The Modern Spectroscope xiii

A multiple transmission prism of  
"Great Resolving Power." (Astro-Phys. Jour. Nov. 1882)

~~F. L. O. Woodworth~~  
The Modern Spectroscope xiv

"Fixed Grating and Concave Grating Spectroscopes"  
(Astro-Phys. Jour. Dec. 1882)

The Modern Spectroscope xv  
(Astro-Phys. Jour. Jan. 1886)

The Modern Spectroscope xvi

A simple optical device for completely  
isolating or cutting out any desired portion of  
the diffraction spectrum, and some further remarks on astronomical spectroscopy.  
(Astro-Phys. Jour. March 1886)



The Modern Spectroscope xviii

"On the Maximum Efficiency in the use  
of the Spectrograph." (Astro-Phys. Journ. May 1896)



15

The Modern Spectroscope XVIII  
On the Maximum Efficiency in the use  
of the Spectrograph. (Astrophys. Jour. Nov 1896)



F. L. O. Wadsworth

12a.

- 5 The Design of Electric Motors for Constant Speed. (Astro-Phys. Journ. Feb. 1895)

F. L. O. Wadsworth

- 6 Notes on Silvering and Silvering Solutions

(Astro-Phys. Journ. March, 1895.)

F. L. O. Wadsworth

- 10 An Improved Form of Interrupter for Large Induction Coils. (Am. Journ. No. 288 - 3 Series, Vol. XLVIII)

11 F. L. O. Wadsworth

- A very simple and accurate Cathetometer.

(Am. Journ. Vol. I, No. 1 Fourth Series)



F. L. O. Woodward

The degree of electric motor for constant speed (data = 6/14 form. Feb 1882)

F. L. O. Woodward

Notes on biliousness and biliousness (data = 6/14 form. March 1882)

An improved form of watermeter for force distribution (Am. form. No. 288. 2 series Vol. 8 & 11)

F. L. O. Woodward

A very simple and accurate catheterometer (Am. form. Vol. I, No. 1. 1st printing)



Chicago

The following experiments are now in course of progress and will probably be completed within the coming year.

Frank B. Jewett

"Change of resistance of metals in a magnetic field"

R. F. Earhart.

"Observations on the Zeeman effect"

Fritz Reichman.

"Capacity of condensers at very small distances between surfaces."

H. O. Murfee.

"Velocity of sound by Fizeau's method"

B. B. James.

"Effect of temperature on index of refraction"



R. A. Millikan

"On the relation between density and  
Experimental determination of the work done  
in the free expansion of gases."

A. A. Michelson

"A reflecting echelon spectroscope."

A. A. Michelson and  
S. W. Straton

"Construction of a two decimeter standard."  
~~which may be compared directly with~~

A. A. Michelson and  
S. W. Straton

"Ruling engine and construction of gratings."



*Laboratories  
and papers  
shown*

The University of Chicago

*File*

August 7, 1902.

My dear Dr. Harper:

The very brief letter which Miss Cobb was kind enough to take last week certainly did not furnish a very complete exposition of the situation. I should have prepared a more complete one in advance, but did not wish to impose upon you another of those long screeds; and besides I had received the impression from Dr. Nef that the status of our storekeeper had been settled in principle. I will attempt in what follows to set forth the chief facts in the case.

I. OTHER INSTITUTIONS.

I have not yet received full information in regard to this subject, in response to my inquiries, but as we must reach a decision about Mr. Freas this week, I append such facts as seem to be pertinent.

It must be remembered that in the institutions to be mentioned instruction is given during nine months only, and thus the vacation is available for much heavy work which with us has to be done right along. In comparing them with us, we must reckon on a one-third larger staff. And then we have to remember that in most institutions students registering for chemistry take a course for one year, and that the checking up of outfits and providing new ones takes place *with them once a year, while with us it takes place* with us on an enormous scale October 1, April 1 and June 18, and on a small scale January 1. To overtake the work I should estimate



The University of Chicago

August 7, 1902.

My dear Dr. Harper:

The very brief letter which Miss Cobb was kind enough to take last week certainly did not furnish a very complete exposition of the situation. I should have prepared a more complete one in advance, but did not wish to impose upon you another of those long accretions; and besides I had received the impression from Dr. Wet that the status of our storekeeper had been settled in principle. I will attempt in what follows to set forth the chief facts in the case.

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## The University of Chicago

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that our service staff would have to be one-half greater than that of another institution carrying an equal number of students at one time. It will be noticed also that the janitor service, as we would call it here, is frequently in charge of the chemistry storekeeper in other institutions. The following list includes strictly chemical service only, except where otherwise noted.

### Leland Stanford Junior University.

1 laboratory inspector  
1 storekeeper  
1 assistant storekeeper  
? ~~Query~~ student assistants.  
250 students: nine months' work.

### University of Munich (fifteen years ago.

1 laboratory inspector  
2 storekeepers  
250 students: eight months' work, with long vacations taken out of this time.

### Johns Hopkins University.

1 professor (selection of material, oversight, orders.)  
1 "head janitor" (solution making, etc.)  
1 storekeeper  
1 assistant janitor (cleaning building also)  
Assistants, fellows and graduate students all help.  
"This has sufficed for 200 students, but the number is sometimes as low as 100" Session is nine months. Much heavy work is done during the vacation.

N.B.--Service is stated by Dr. Holmes to be unsatisfactory.







## The University of Chicago

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### Harvard.

- 1 director of laboratory (receives requisitions from store-keepers and instructors; gets bids; places orders; personally supervises everything about building and contents: importation order occupies his whole time sometimes for as much as a month).
  - 1 storekeeper
  - 1 assistant storekeeper
  - 1 accountant (part of the year)
  - 1 "head janitor" (chemical service)
  - 2 assistant janitors (partly cleaning: one cleaner besides, occupied half the day).
  - 1 boy (coat room and other miscellaneous jobs).
- 600 students in the course of the year, which is nine months long. Heavy work is done in the vacation.

Professor Jackson, who gives me above details, says the system works admirably. Students who have seen the laboratory, from their point of view, state that it is utterly unsatisfactory.

### Massachusetts Institution of Technology.

- 1 vice-director (Professor Gill: same functions as director of Harvard Laboratory).
  - 1 storekeeper
  - 1 assistant storekeeper
  - 1 attendant for Freshman classes
  - 1 solution man
- Instructors (check up apparatus and close accounts).  
Number of students unknown: year nine months.

### University of Chicago.

- 1 storekeeper
- 10-12 students paid by the hour according to amount of service. They average 133 hours in the quarter apiece, at varying rates carefully measured to the efficiency of their service. This is equivalent to from 2 to 2-1/2 men putting in full time. Two and a half men, possessing amongst them the technical knowledge required in much of this work, would certainly cost in the neighborhood of \$1500 or \$1600 a year, which is precisely what we now spend on Student Service. We have the advantage, however, that



Harvard.

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I storekeeper  
I assistant storekeeper  
I accountant (part of the year)  
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2 assistant janitors (partly cleaning; one cleaner besides, occupied half the day).  
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Massachusetts Institution of Technology.

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I storekeeper  
I assistant storekeeper  
I attendant for freshman classes  
I solution men  
Instructors (check up apparatus and close accounts).  
Number of students unknown: year nine months.

University of Chicago.

I storekeeper  
10-12 students paid by the hour according to amount of service. They average 125 hours in the quarter office, at varying rates carefully measured to the efficiency of their service. This is equivalent to from 2 to 3-1/2 men put-ting in full time. Two and a half men possessing amongst them the technical knowledge required in much of this work would certainly cost in the neighborhood of \$1500 or \$1600 a year, which is precisely what we now spend on Student Service. We have the advantage, however, that



## The University of Chicago

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with a number of individuals, we are able to employ them all for the whole day during our brief vacations, in getting ready for the following quarter, and then use ~~as~~ them more sparingly as occasion requires during the quarter.

Work continues throughout the year. Students: as many as ~~275~~ last ~~spring~~ <sup>Autumn</sup> quarter, and constantly increasing.

No professor in our department <sup>last</sup> is burdened in the way in which the directors of the ~~first~~ two of the institutions mentioned are burdened by work which could be done better by men receiving half their salaries and devoting their time exclusively to the job.

### II. QUALITIES REQUIRED IN THE INSPECTOR OR HEAD STOREKEEPER.

1. The inspector must be a man of sufficient age, intelligence, business ability, technical knowledge and experience to command the respect of the students, particularly graduate students, and the instructors. He is under my direction as deputy of Dr. Nef, and takes no orders from any other instructors. This plan is the one preferred by Dr. Nef.

2. It is difficult, without diffuseness, to describe the degree of technical knowledge required to one who has not lived in a laboratory.

(a) He must know the various grades of the same chemical, of which there are sometimes six or eight kinds in stock, of very different costs. He must know this for the purpose of serving out the correct article for the work in hand to a student who does not himself know which of them he needs. In other words, his service has an important relation to instruction. He must know the applications to be made of each chemical and grade of the same chemical,



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## II. QUALITIES REQUIRED IN THE INSPECTOR OR HEAD STOREROOMER.

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## The University of Chicago

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and the amounts of each which are consumed. <sup>make</sup> ~~so as to~~ <sup>order</sup> ~~the~~ <sup>economically</sup> He must have the same knowledge in regard to apparatus, both as regards serving out and ordering.

Large amounts of money are easily thrown away by ordering the wrong kind of material and wrong quantities. What we need is a central man who knows what every instructor wishes his pupils to use, and we expect in return, and in our case receive, valuable suggestions of all descriptions, which can only come from a central man with this full knowledge.

(b) He must have technical knowledge in order to understand the working and frequent failure of stills, water-baths, many designs of generators for different gases, and other special pieces of apparatus used in research (for example, a thermostat recently installed for work in physical chemistry). These things are used by different instructors and their students, and must be suited to the needs of these different people, and be under the charge of ~~someone~~ <sup>some</sup> man continuously. He must from all these points of view study the needs of the laboratory, and can, and in our case does, offer valuable suggestions in regard to improvements. He is a center of information and thought on these subjects in a way in which no individual instructor can be, unless he greatly exceeds his functions as an individual instructor.

(c) He must know about solutions and special reagents, many of which have to be made in the laboratory. He must plan and maintain an exact and systematic arrangement of these in such a way



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## The University of Chicago

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that, although entirely different sets are used in different rooms, they shall always be in perfect order and readiness at all times. The great point is that the student must be able to find precisely what his work demands ready at hand. <sup>without loss of time</sup> The efficiency of our teaching depends very largely on this. If even so much as one bottle becomes displaced, half the members in the class may waste ten minutes apiece through not being able to find it. Naturally they do not know whether such a bottle exists, even. In general chemistry, for example, 235 different reagents are provided in each of the two laboratories. In analytical chemistry the number is even greater. Here again a common center in which the requisite knowledge is stored is valuable. Suggestions can frequently be made to the instructors, and are frequently made, in regard to these arrangements, and the efficiency of the instruction is thereby appreciably increased.

(d) The man must possess the most immaculate trustworthiness in the matter of enforcing the regulations in regard to materials. For example: some articles are loaned to the students for three hours only (non-return followed by a fine),--otherwise much larger expenditures for increased equipment would be needed. Again, exactness in measurement of the quantities of material sold to students avoids loss which, when multitudes of small transactions are considered, might easily become relatively enormous. The superior position of the inspector secures exact observation of these rules, and in the case of Mr. Freas has brought about great economies as compared with the previous occupant of the same office.







## The University of Chicago

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3. Leland Stanford Junior by its offer to Mr. Freas evidently wants precisely such a person, although they do not have as many students as we have.

I hear also incidentally that Harvard University is going to appoint such a person next year to relieve Professor Hill of the enormous amount of work which he has done with great devotion for many years. As I remarked above, in spite of Dr. Hill's labors, the service is inefficient, and every chemist in the country knows that Dr. Hill's ability as an investigator and teacher has been almost nullified by the necessity of giving unremitting<sup>ing</sup> attention to laboratory details. *Dr Hill is senior Professor.*

In Munich and other Continental universities there is a laboratory inspector of an entirely different class from the storekeepers.

4. The most concise argument perhaps is that we have tried Mr. Fox and Mr. McKillop, and the experiment was a total failure. We had nothing but trouble all the time while Fox was in the storeroom, although there was often scarcely a third as many students as we have now. I was totally prevented from doing any research by my attempts to keep the storeroom affairs straight. We were throwing away about a thousand dollars of my salary from the point of view of the department in order to save<sup>r</sup> a few hundred in the storeroom, and at the same time that this waste was being perpetrated the career of one of the instructors was being threatened. As is shown by the experience at Harvard and many other universities that I could name, as well as our own,-- no instructor from the nature of the case can do this work with the same efficiency as a proper



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## The University of Chicago

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storekeeper, and the ~~minute~~<sup>small</sup> economy which appears to be effected is at the expense of an enormous waste of the time and powers of highly paid instructors.

### III. THESE FACTS IN APPLICATION TO OURSELVES.

1. I am informed by Dr. Holmes—the subject came up by accident in the course of conversation—~~that~~<sup>and others</sup> we have at present the best laboratory service in the country. And this, as I have tried to show, means in large part good work and good instruction. Dr. Holmes has worked as a student in Harvard and Johns Hopkins and as instructor in the Massachusetts Institute and here. He says that our service is incomparably better than that of the other three.

2. If we go back to the ideal of a \$600 or \$800 man in the storeroom, we have no alternative but to sacrifice some instructor of higher rank in supplying a head and center for the management of the whole concern. As I have said, no one instructor, as such, can do this properly. The person selected would have to spend unlimited time in the storeroom, in interviews with other instructors, with manufacturers and with agents. He could do no research and contribute no strength to the department scientifically. With all this, assuming that a capable person sufficiently interested in this branch of the work could be found, the result could not be as good as that which we have at present. The task is a vastly greater one than anyone who does not know its details intimately can readily understand.

It must be remembered that the problem here is entirely different from that in other institutions. We have four quarters of







## The University of Chicago

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instruction, <sup>no</sup> ~~on~~ one instructor is here all the time, and the head who controls the cheap storekeepers <sup>or student-</sup> ~~would have~~ to be present all the time, otherwise the efficiency would suffer. Naturally also, a larger salary must be paid ~~when paid~~ under our circumstances. There is no "Great University" glamour about the position of storekeeper in Kent Laboratory. We must pay just what would be paid down in the city for a person of the same business experience and capable of carrying the same responsibility. If Mr. Freas were allowed to go, we should have the choice of hiring a person as capable as he is at a larger salary, or of sacrificing one of the present instructors, or of appointing a new person with more interest in storerooms than in science and appointing him merely nominally to the teaching staff.

3. Williams received a salary, ~~laterally~~, of \$1500, when the appropriation of the Chemical Department was \$1200, and the total appropriations of the Biological and Chemistry Departments which he expended was not more than \$2500. Now chemistry alone spends an appropriation of \$6600. It should be noticed that Simpson now performs toward the Chemical Department practically none of the functions which Williams did; he is hardly ever in the building. All that Williams did, except the clerical work connected with the Press control of purchases, is done by Mr. Freas.

4. In a letter written May 30, 1902, Dr. Stieglitz explained fully that the laboratory fees at the rate of \$5.00 per major are amply sufficient to cover the storeroom expenses. Let me recall the chief facts:



instruction, <sup>50</sup> one instructor is here all the time, and the head who controls the cheap storekeepers <sup>usually</sup> ~~would~~ have to be present all the time, otherwise the efficiency would suffer. Naturally also, a larger salary must be paid ~~under our circumstances~~. There is no University <sup>of</sup> Chicago <sup>about</sup> the position of storekeeper in Kent Laboratory. We must pay just what would be paid down in the city for a person of the same business experience and capable of carrying the same responsibility. If Mr. Treas were allowed to go, we should have the choice of hiring a person as capable as he is at a larger salary, or of sacrificing one of the present instructors, or of appointing a new person with more interest in storekeeping than in science and appointing him merely nominally to the teaching staff.

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4. In a letter written May 30, 1902, Dr. Stieglitz explained fully that the laboratory fees at the rate of \$5.00 per major are amply sufficient to cover the storeroom expenses. Let me recall the chief facts:



## The University of Chicago

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Laboratory fees (1901-02), exclusive of medical students...	\$2698.00
Laboratory fees, medical students.....	<u>775.50</u>
	\$3473.50

This total does not include the fees of classified students paying medical tuition. I have not had time to get the facts in regard to these.

The following table, taken from Dr. Stieglitz' letter, shows the expenses which the laboratory fee is to meet:

Chemicals, per major.....	\$1.56
Repairs of iron work.....	.20
Student service.....	1.30
Storekeeper (Mr. Freas).....	.70
Extra janitor service needed, and granted during past three weeks on trial.....	<u>.72</u>
	\$4.48
Balance unspent.....	<u>.52</u>
T o t a l.....	\$5.00

The details in regard to these items are given in Dr. Stieglitz letter. The <sup>unappropriated</sup> fifty-two cents from 700 students amounts to \$364. Dr. Stieglitz says that <sup>average</sup> you agreed with him that we should either reduce the laboratory fees or spend the money for the benefit of the students. The department does not feel that it needs to be assisted in gaining students by lowering the laboratory fees, while it is thoroughly convinced that the most efficient service that can be purchased will be best for the Department as a whole. It would advise, therefore, that the sums which have been and are being collected should be applied to the storeroom service.

*You see from the table the fee is collected primarily for service, or nothing.*



# The University of Chicago

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Laboratory fees (1901-02), exclusive of medical students... \$2888.00  
 Laboratory fees, medical students... 775.50  
 \$3663.50

This total does not include the fees of classified students paying medical tuition. I have not had time to get the facts in regard to these.

The following table, taken from Dr. Stieglitz' letter, shows

the expenses which the laboratory fee is to meet:

Chemicals, per major.....	\$1.50
Repairs of iron work.....	.30
Student service.....	1.30
Storekeeper (Mr. Fress).....	.70
Extra janitor service needed, and granted during past three weeks on trial.....	.75
	\$4.48
Balance unpaid.....	.52
Total.....	\$5.00

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collected should be applied to the storeroom service.

*From the letter to the President, January 1902.*



## The University of Chicago

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### IV. MR. FREAS'S CASE.

1. It might be decided that the maximum salary attaching to the ~~Inspector's~~ ~~storekeeper's~~ position should be \$1600. *(We could pay \$1400 now.)*
2. That an increase for the year 1903-04 of \$200 should be promised

-----o-----

The position in California is to be one drawing \$1500. The occupant is to have three months' vacation, and to be free from personal attendance in the storeroom. Of course, living in Palo Alto is cheaper than in Chicago.

In addition to these things, the Department can easily grant Mr. Freas a somewhat longer vacation than it has previously done, by giving it in the spring instead of in September, which was previously the worst time.

In a letter dated May 11, 1901, I proposed a salary of \$1200 for Mr. Freas, and explained at considerable length what appeared to me to be the injustice with which he had been treated by the Department. Mr. Freas has never referred to this aspect of the matter, and for all one could tell might be unconscious of it, but I ~~have~~ certainly felt <sup>then</sup> that he had not been treated fairly.

Although there are conveniences attaching to the employment of a number of student assistants, there are difficulties which arise when the number becomes so great as with us. The Department would like, therefore, to concentrate some of this work without expending upon it any more money. If half the student assistants could be



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The University of Chicago

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replaced by two students who put in half their time and attempted to do only half work in the University, this difficulty would be largely met. I would suggest that these men should be paid \$100 per quarter, out of which they would pay (for half instruction,  $\frac{1}{2}$  1-1/2 majors, including one laboratory course) \$25.00 tuition. The total expense would be:

Two students for 4 quarters at \$100.....	\$800
Tuition paid by same.....	<u>200</u>
Cost to Department.....	\$600

This arrangement would reduce the Student Service account to one-half its present figure, and on account of the convenience which it would bring, the Department would like to make this change irrespective of the problem of Mr. Freas's remaining.

We have in mind plans which, by rearrangement of the storerooms and solution room, will enable us to effect a considerable saving in the remainder of the Student Service, as soon as they can be carried out.

In conclusion, I want to say that Mr. Freas's whole attitude is that of trying to save money for the University in every possible way, and he is continually engaged in planning ways of doing

this in connection with the service of the laboratory. *It would be more economical to increase his salary and to keep him.*

Yours sincerely,

Alexander Smith



The University of Chicago

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replaced by two students who put in half their time and attempted to do only half work in the University, this difficulty would be largely met. I would suggest that these men should be paid \$100 per quarter, out of which they would pay for half instruction,  $\frac{1}{2}$  of \$100, leaving \$50.00 tuition. The total expense including one laboratory course) \$25.00 tuition. The total expense would be:

Two students for a quarter at \$100.....	\$200
Tuition paid by same.....	200
Cost to Department.....	\$400

This arrangement would reduce the Student Service account to one-half its present figure, and on account of the convenience which it would bring, the Department would like to make this change irrespective of the problem of Mr. Press's remaining. We have in mind plans which, by rearrangement of the storerooms and solution room, will enable us to effect a considerable saving in the remainder of the Student Service, as soon as they can be carried out.

In conclusion, I want to say that Mr. Press's whole attitude is that of trying to save money for the University in every possible way, and he is continually engaged in planning ways of doing this in connection with the service of the laboratory. I want to say that I am sure that he is doing his best to help the University in every way possible. Yours sincerely,

Robert A. Millikan



No V.C. for research mfg.

Mr. Salisbury had a comment!

The University of Chicago

The University Laboratories

OFFICE OF THE DIRECTOR

June 4th, 1913.

President Judson,

Dear President Judson:-

I have completed a study of the departments of science in which laboratory work<sup>a</sup> forms a prominent feature of the work. In order to arrive at knowledge of the situation in regard to the question of assistants, it was necessary to include in the study the problem of courses offered~~and~~ and the relation of the staff to courses, since in a number of departments instructors are used virtually as assistants and in others they take the place of assistants. This part of the report would perhaps more properly concern Dean Angell and Dean Salisbury, than myself and they will be able to confirm or supplement my own conclusions in such questions. I have not consulted them about the report ~~&~~ (except Dean Salisbury in regard to Botany) and perhaps I should have done so. It was also necessary to take into consideration the matter of service--since in certain departments highly salaried instructors are virtually doing work which could be done more economically and advantageously by lower salaried men, as collectors, preparators etc.

Finally it was necessary to take into consideration the relation of research instruction to instruction in general.

I shall first present general recommendations, concerning all the departments, <sup>under</sup> ~~on~~ each of these four heads, instruction, research, assistance and service, and then present recommendations concerning individual departments, with a study of their present conditions.



June 4th, 1913

President Johnson

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departments of science in which laboratory work forms a prominent feature of the work. In order to arrive at knowledge of the situation in regard to the question of assistants, it was necessary to include in the study the problem of courses offered and the relation of the staff to courses, since in a number of departments instructors are used virtually as assistants and in others they take the place of assistants. This part of the report would perhaps more properly concern Dean Angell and Dean Salisbury, than myself and they will be able to confirm or supplement my own conclusions in such questions. I have not consulted them about the report (except Dean Salisbury in regard to Botany) and perhaps I should have done so. It was also necessary to take into consideration the matter of service - since in certain departments highly skilled instructors are virtually doing work which could be done more economically and advantageously by lower ranked men, as collectors, preparators etc. Finally it was necessary to take into consideration the relation of research instruction to instruction in general. I shall first present general recommendations, concerning all the departments, as a basis of consideration, then, instruction, research, maintenance and service, and then present recommendations concerning individual departments, with a study of their present conditions.



## The University of Chicago

### The University Laboratories

2.

OFFICE OF THE DIRECTOR

The suggested changes should, at least, result in a more efficient and more economical use of the resources of the University expended in these departments, and taken altogether, there should also be some saving in money actually expended. In the few instances where recommendations involving a reduction of appropriations are made, it is suggested that they should be put into effect by means of the special Summer Quarter appropriations for the departments in question. By arranging that the staff on hand be used more effectively for the four Quarters rather than for three, the changes can be made with a minimum of hardship and disturbance of the arrangements of departments.

In some instances, it is recommended that instruction expenses be converted into service expenses, by the reduction of instructing assistants and the employment of service appointees. Besides an increase in efficiency and convenience, such changes would have the important advantage for the University that service appointees advance, if at all, very slowly and very slightly in salary and the University will be under somewhat lesser pressure for promotions and greater increases in salary.

It is suggested that the changes outlined, if approved by you, represent a program for gradual development in departments, not primarily for immediate and radical action.

All the department heads have been exceedingly helpful toward reaching an understanding in this complex situation and they seem anxious to co-operate in every possible way, being of the opinion that most of the suggestions made would



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The University of Chicago

The University Laboratories

3.

OFFICE OF THE DIRECTOR

be of decided advantage in the organization of their  
departments.

Yours sincerely,

*Julius Stieglitz*

There is a recommendation concerning  
Physics on p. 13, which should be  
considered before you leave, I believe.  
J.S.



The University of Chicago

The University Laboratory

OFFICE OF THE DIRECTOR

be of decided advantage in the organization of their

departments.

Yours sincerely,

John D. Rockefeller

There is a memorandum concerning  
the proposed plan of the  
University of Chicago, dated  
April 13, 1906, which is  
being forwarded to you for  
your consideration.