Annual Report

of the

Board of Regents

of the

University of Arizona

College of Agriculture

and

Agricultural Experiment Station

1892.

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MERRILL P. FREEMAN, President.

Calendar for 1892-93.

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Wednesday, Sept. 28.....Entrance examinations, 9 a. m
Friday, Dec. 23.....Close of examinations for Fall Term
Tuesday, Dec. 27.....Winter Term begins
Tuesday, March 7.....Close of examinations for Winter Term
Wednesday, March 8.....Spring Term begins
Wednesday, May 31.....Close of examinations for Spring Term
Thursday, June 1.....Summer course in Field Work, ending June 21

Board of Regents.

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MERRILL P. FREEMAN, *President*.....Tucson
JOHN M. ORMSBY, *Secretary*.....Tucson
SELIM M. FRANKLIN, *Treasurer*.....Tucson
JOHN GARDINER.....Tucson

EX-OFFICIO.

N. A. MORFORD, *Secretary of the Territory*.....Phœnix
GEO. W. CHEYNEY, *Superintendent of Public Instruction*.....Tombstone

Faculty and Other Officers.

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MERRILL P. FREEMAN,
Chancellor.

FRANK A. GULLEY, M. S.,
Dean of School of Agriculture, Professor of Agriculture, Director of Experiment Station.

THEODORE B. COMSTOCK, Sc. D.,
Director of School of Mines, Professor of Mining and Metallurgy.

CHARLES B. COLLINGWOOD, M. S.,
Professor of Chemistry, Chemist of Experiment Station.

EDWARD M. BOGGS,
Professor of Mathematics and Irrigation Engineering, Irrigation Engineer of Experiment Station.

JAMES W. TOUMEY, B. S.,
Professor of Botany and Entomology, Botanist and Entomologist of Experiment Station.

L. E. BENTON,
Acting Professor of Horticulture, Horticulturist of Experiment Station.

*_____
Professor of Physics and Applied Mathematics.

*_____U. S. A.
Professor of Military Science and Tactics, Instructor in Mathematics.

MEADE GOODLOE,
Instructor in Assaying.

*_____
Professor of Geology and Mineralogy.

GEORGE L. HOXIE, M. E.,
Instructor in Mechanics and Industrial Drawing.

HOWARD J. HALL, B. S.,
Instructor in English, and Principal of Preparatory Department.

JOSEPH A. HEBERLY, *Assistant Chemist Experiment Station.*

MARK WALKER, *Assistant Horticulturist.*

R. S. STOCKTON, *Stenographer.*

R. J. FERGUSON, *Engineer.*

H. W. BLAISDELL, *Superintendent Yuma Experiment Station.*

M. MOSS, *Foreman Phœnix Experiment Station.*

*Chairs to be filled.

Report of the Board of Regents.

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UNIVERSITY OF ARIZONA,
OFFICE OF THE PRESIDENT,
Tucson, Ariz., Dec. 31, 1892.

To His Excellency, Nathan O. Murphy, Governor:

SIR: I have the honor to submit the following report of the Board of Regents of the University of Arizona, for the year 1892, and as a preliminary thereto, and for the purpose of indicating its object and full scope, I beg to quote the following extracts from the act of the Legislature of the Territory of Arizona establishing the "University of Arizona," the act of Congress establishing "Agricultural Experiment Stations" in connection with colleges, and the act of Congress for the "more complete endowment and support of the colleges for the benefit of Agriculture and the Mechanic Arts."

UNIVERSITY OF ARIZONA.

Act of the Legislature of the Territory of Arizona, approved March 12, 1885, Sec. 2499, Revised Statutes: "The Board of Regents shall make a report annually to the Governor of the Territory, on or before the second day of January of each year, exhibiting the state and progress of the University in its several departments, the course of study, the number of professors employed, and students in attendance, the amount of receipts and expenditures and such other information as they may deem proper."

AGRICULTURAL EXPERIMENT STATIONS.

Act of Congress, approved March 2, 1887, Sec. 3: "It shall be the duty of each of the said stations, annually, on or before the first day of February, to make to the Governor of the State in which it is located, a full and detailed report of its operations."

COLLEGES OF AGRICULTURE AND THE MECHANIC ARTS.

Act of Congress, approved August 30, 1890, Sec. 3: "An annual report by the president of each of said colleges shall be made to the Secretary of Agriculture, as well as to the Secretary of the Interior, regarding the condition and progress of each college, including statistical information in relation to its receipts and expenditures, its library, the number of students and professors, and also as to any improvements and experiments made under the direction of any experiment stations attached to said colleges, with their cost and results, and such other industrial and economical statistics as may be regarded as useful, one copy of which shall be transmitted by mail, free, to all other colleges further endowed under this Act."

Under these several acts, Congressional and Territorial, three separate and distinct reports are called for, two of which are to the Governor of the Territory, and one to the Secretary of the Interior, and the Secretary of Agriculture. I see no impropriety, however, in embodying the three in this one, making such separate financial reports as may be called for under each act, thereby maintaining the spirit of each, and at the same time giving to each the full benefit of the whole.

As it is more than probable that no more than a superficial understanding is now had of what is comprehended under these three several heads, I have thought it well to embody in this report the acts of Congress in full, the former, establishing Agricultural Experiment Stations, being known as the Hatch law, and the latter, endowing colleges for the benefit of Agriculture and the Mechanic Arts, being known as the Morrill bill. Under the former it is seen that the University receives the sum of $15,000 each year, to be expended in the specific manner indicated in the act, and that should any portion of said sum remain unexpended at the end of the fiscal year it will revert to the general government. This contingency is hardly necessary to have been provided for so far as our individual needs are concerned, as the field opened up in the lines indicated in the act is so broad, and so expands by development, that the amount that might be judiciously and profitably used is much greater than the sum now received.

This $15,000 is paid to the Board in installments of $3,750, by a draft being mailed to the Treasurer of the Board at quarterly intervals beginning with January the first in each year.

The Morrill bill appropriated $15,000 for the year 1890, increasing

by $1,000 each year till the amount received for this, the fiscal year ending June 30, 1893, is $18,000, "to be applied only to instruction in agriculture, the mechanic arts, the English language, and the various branches of mathematical, physical, natural, and economic science," and this instruction is "with special reference to their applications in the industries of life, and to the facilities for such instruction."

The field covered by the limitations as to what may be taught under this appropriation is sufficiently broad, and the intent is to fit the student that when he goes from the University he is prepared to at once apply in a practical way the technical and theoretical knowledge that he has there acquired and make it immediately available, and, therefore, giving it an immediate and especial value.

The friends of this bill were particularly jealous that no part of this appropriation should be applied to, or used for any purpose not specifically contemplated in the act, and while it is sufficiently broad and liberal, its limitations confine the expenditure to certain fixed lines, beyond which we may not go, and it has been the earnest effort of the Board of Regents faithfully to carry out the intent of the framers of the law, and strictly conform to its letter and spirit in every detail. It is held that the language of the act authorizes the use of this money in the purchase of apparatus, machinery, text-books, reference books, stock and material, used in instruction or for purposes of illustration in connection with any of the branches enumerated, and the payment of salaries of instructors in said branches only. The erection of buildings is specifically prohibited by the act, and the purchase of land is not allowable. It cannot be expended for repairs, furniture, cases, shelving, or the like, or for musical instruments, or the salary of a music teacher. In short, the plant—the land, buildings, and ordinary appliances of a school—must be provided from other sources, and this particular fund must be applied exclusively to the subjects named in the act and the facilities especially required for those subjects.

A draft for the full amount of the annual appropriation under this bill is sent to the Territorial Treasurer in the month of July in each year, and this is drawn upon by the Board from time to time as needed. This fund differs from the Experiment Station Fund in that any unexpended balance of one year is retained and carried over to the following year, and does not revert to the United States Treasury.

From the foregoing it will be seen that we have three funds upon which to draw, designated by us as the College Fund, the Experiment Station Fund, and the University Fund; the first two will now be

understood. The University Fund is derived from the tax of one half mill, amounting to about $13,500 this year, and the surplus, after paying the interest, derived from the original tax of two and one half cents on the $100 of taxable property in the Territory, provided for to pay the interest on the $25,000 of University bonds authorized by the act establishing the University. This surplus amounts at present to about $4,500 each year, making the aggregate gross receipts this year from all sources, United States and Territorial, say $51,000.

DISBURSEMENTS.

In the disbursement of this large sum great care is exercised by the Board, and a complete and careful system of checks has been established to prevent any possible error. Pay-rolls are signed for all salaries, and vouchers for all purchases that do not come under the immediate notice of the Board are first endorsed by one of the Deans as being correct, the voucher then passes to the Auditing Committee, consisting of the president and any other one member of the Board, and, after being duly audited, is then presented to the Board at one of their regular meetings, and if allowed is so endorsed. The warrant upon the treasurer for its payment is then drawn by the secretary, and, together with the voucher, is presented to the president for his signature, and if upon comparison with the voucher it is found to be correct, the warrant is signed, and an endorsement to that effect is made upon the voucher, and the warrant together with the voucher, is then returned to the secretary, who delivers it to the party entitled to it upon his receipting the voucher, which is then permanently filed in the office of the secretary.

For the faithful performance of his duties each individual member of the Board files with the Territorial Treasurer his duly approved bond in the sum of $5,000, and in addition to this the Treasurer of the Board files an additional bond as such treasurer in the sum of $15,000.

It will thus be seen that every possible safeguard is thrown around the proper distribution of the funds committed to the care of the Board.

HISTORY AND ORGANIZATION.

The history of the establishment and organization of the University of Arizona has already been so often referred to, and so fully covered in different ways, that I conceive it now to be so well understood that its repetition would be supererogatory; the act of the Legis-

lature of 1885 establishing it, the issuance of the bonds of the Territory in the sum of $25,000 in its behalf, and the erection of the University building, all of these leading up to the selection and employment of the different members of the faculty, a task not easy of accomplishment under the most favorable conditions, and less so with us owing to our remoteness from educational centers to which we had to apply, the uncertainty in the minds of those who were disposed to come to us as to what they might be able to accomplish in a new country, and with an institution so absolutely new and untried; these, coupled with the fact that ability of the peculiar character necessary to assure success in a young institution like ours is much sought after, makes the success attained in this particular line peculiarly gratifying, and for this we are largely indebted to Prof. F. A. Gulley, Dean of the School of Agriculture and Director of the Experiment Station, whose very early connection with the institution and valuable and intelligent aid and advice have contributed so largely to the success in securing a corps of professors and instructors, each and all of whom, in addition to their special qualifications for their specific lines, possess that rare combination of elements that always insures success: industry, energy, zeal and enthusiasm.

The School of Mines, the College of Agriculture and the Agricultural Experiment Station each has its distinctive characteristic and its inherent function, and each is regulated and governed by its own legislative enactments. Each, however, is but an integral part of the University as a whole, which they go to make up, and I prefer to consider them together as simply constituting the University of Arizona.

The University was opened to students on October 1st, 1891, and, considering the short time that has elapsed since then, satisfactory progress has been made in all the departments, with apparently growing appreciation and kindly feeling towards it from all parts of the Territory. An earnest effort is being made to bring to the more distant parts of the Territory a full and just realization of the merits and advantages of our home instiution, in order that all may get their due proportion of its benefits. Every possible facility is extended to students from distant points, and the expense of attending reduced to a minimum. Temporary accommodations have been provided for such at the University at a maximum cost of $20 per month, and the early completion of the dormitory, the want of which is already being felt, will give permanent accommodations.

BUILDING AND PLANT.

The University building is a splendid structure of brick and stone, is lighted by gas generated on the grounds, and on special occasions by electric light from the dynamo used for illustration. Within it are two magnificently equiped laboratories, and in the machinery annex adjoining is a complete milling plant for treating and testing ores in various ways, and for illustration to the student, and where he is taught in a practical way the different methods employed.

In the procuring of machinery, instruments, laboratory material, apparatus, etc., every possible advantage has been taken of the situation to obtain special concessions from manufacturers, and of the exemption from duty on importations for University purposes. Effort has been made, however, to obtain the very best.

An engine on the grounds furnishes the motive power for the machinery and dynamo, and also for the pumping plant to supply the buildings and grounds with water for domestic use, irrigation, and protection against fire. Two buildings for residences for members of the faculty have already been erected and a third is now under construction, and the dormitory for students will be begun immediately; the specific object of the University tax provided for by the last Legislature being for these buildings.

THE UNIVERSITY, ITS PRACTICAL UTILITY.

The contention that the establishment of the University of Arizona was premature may find some friends. If it were a purely technical institution endeavored to be conducted upon the same plane as a Harvard or Yale, there might be some merit in the claim. It has been the aim, however, of the Board of Regents to make it of practical value, and to this end those lines are being followed that seem to lead to the best immediate and practical results that are of greatest value to the entire Territory. Mining being one of our largest and most valuable industries, the School of Mines is made a leading feature, and here opportunities are presented not only to the student who desires to take the regular course that leads to his degree, but facilities are extended to the miner himself whose years of practical experience have shown him the need of a limited special course that will enable him to more intelligently pursue his special calling. Or should the mine owner wish to test his ore for the purpose of ascertaining its most economical treatment, it may be brought here with the assurance

of receiving the benefit of educated handling looking to the interests of its owner. Another important factor in the progress and development of the Territory is taken up, and considered from a practical and economical standpoint, in the department of Irrigation Engineering, and the soil and water analyses in the laboratory of the chemist are in the same line; while the experiments being made with the native canaigre for the purpose of testing the practicability of its successful cultivation gives promise that this alone will return to us a hundred fold the cost of the entire institution. It may not return directly to the treasury, but directly to the people who contribute to that treasury. And the experiments now being made at the Phœnix station for the purpose of ascertaining the most economical fattening feed for cattle, while hardly to be considered as a part of a college curiculum, is, nevertheless, a part of a line of work that only the establishment of the University could have made possible. If it is preferred to consider the question solely from the narrow standpoint of the economist he is confronted with these facts; the grants from the general government would not, and could not under the law, have been made available without the establishment of the University, the Acts of Congress so provide.

The total amount expended to date by the Territory is shown to be as follows:

Bonds of the Territory in aid of the University....	$25,000	
Interest on said bonds to date.....	12,000	
Amount expended from University Fund.....	55,800	
Total amount contributed by the people of the Territory.....		$92,800
Receipts to date from the general government in aid of the College of Agriculture.....	$66,000	
Receipts to date from the general government in aid of the Agriculture Experiment Station.....	47,500	
Total amount received by the people of the Territory from the government.....		$113,500
Contributed to the Territory in excess of the amount contributed by the Territory.....		$20,700

Or showing that the Territory has already received $20,700 more than the total amount of its own contribution. Not only has there come into the Territory more than the gross amount of its own expenditure but under the University it has the following assets:

UNIVERSITY ASSETS.

University (see inventory)	$64,200	
College of Agriculture and School of Mines (see inventory)	26,465	
Experiment Station (see inventory)	15,441	
Total		$106,106

Or showing that the Territory owns at the present moment, through its University, property the value of which based on a conservative estimate inventories $106,106, or $13,306 more than its own gross expenditure of $92,800.

The University is of more than ordinary value to the Territory at this particular time in that it is an educational factor beyond the narrow limits of its own campus. It teaches the capitalist of New York, or other monied center, that the Territory of Arizona is no longer dominated by the dread Apache, that crime and ignorance are here in the proportion found in his own home, no more, possibly no less, and that his earnings will find the same protection when invested here as in his own native state. The University teaches him these things because the very word implies to him civilization and progress, cultivation and enlightenment, and he is less timid. It teaches the farmer on his bleak New England hills that he may come here, and while cultivating his vine and his fig tree, his children may find the same educational facilities at his door here as those he leaves behind him, and the question of his coming is more easy of solution.

INSURANCE.

In order that we may be protected against total loss in case of fire we have placed insurance as follows:

On University building	$22.000
On machinery annex	500
On machinery	4,000
On library	1,000
On furniture	500
On laboratory apparatus	2,500
On residence buildings	8,000
Total	$38,500

UNIVERSITY LAND GRANT.

Under an Act of Congress of February 18th, 1880, there were granted to the Territory of Arizona 72 sections—46,080 acres—of land for University purposes, and your attention is respectfully called to a letter, in relation thereto, of the Hon. Commissioner of the General Land Office, herewith, in reply to a communication from me in regard to the same.

Under said act the 72 sections, embracing in the aggregate 45,678.68 acres, were selected, but at the request of the Governor of the Territory 12 of the selected sections were cancelled, the timber thereon having been removed, thereby rendering the land valueless. In addition to this there were 1¾ sections unapproved, the lands selected being unsurveyed. There are, therefore, still to be selected 13¾ sections to complete the grant of 72 sections. I would recommend that these selections be made at an early day. The selections already made were all in the timber belt of the northern part of the Territory, and their value lay in the timber thereon. Twelve of the sections having become valuless by being denuded of their timber, I would recommend that the 13¾ sections yet to be selected to complete the quota be located in the arable sections of the Territory, say, along the Salt, the Gila, or the Santa Cruz river, and under canal systems, either completed, or under construction, or in contemplation, when there is no reasonable doubt of ultimate completion, as these lands will become more valuable each year, with no possible chance for deterioration, as has been the case with the 12 cancelled sections. The 13¾ sections, if taken in the manner suggested, should not be taken in a body, as this would prejudice the interests of the owners of the canal under which located to too great an extent, and deprive the enterprise of the legitimate fruits of its industry, but should be apportioned under different irrigation systems so that the withholding of the selected land should not work a hardship in any individual case. I would suggest the advisability of investigating the present status of the land already selected to see if some of it be not in the condition of the 12 cancelled sections, and if so, that steps be taken to obtain other lands in lieu thereof.

RECOMMENDATIONS.

First: Under concurrent resolution No. 4, of the Territorial Legislature approved March 7, 1891, there was transferred from the Uni-

versity Fund to the General Fund of the Territory the sum of $1,000, and under the same resolution this sum was subsequently returned to the University Fund. Under Joint Resolution No. 10, approved March 19, 1891, the sum of $2,030 was transferred from the University to the General Fund, but unfortunately the Territorial Treasurer could find no law authorizing its return. This was undoubtedly an oversight on the part of the drawer of the resolution, as it was undoubtedly intended that this amount should be repaid to whatever fund it should be taken from as soon as there should be money in the General Fund. At the time of the passage of the resolution there was no money in the General Fund with which to pay certain clerks of that session of the Legislature, and this resolution was simply an authority to borrow the amount necessary from some fund having it till such time as it could be returned from the General Fund, the one from which it was payable, just as was provided in the previous resolution. I would recommend that the necessary legislation be had at as early a day as possible authorizing the return of this $2,030 to the University Fund.

Second: At the close of the Columbian Exposition in Chicago it is probable there will be in the hands of the Board of World's Fair Managers for Arizona a valuable collection of mineral specimens, fossils, Indian curios, and antiquities, I would most respectfully but urgently recommend that all these be at the time turned over to the University that steps may be taken by the Board of Regents to take charge of and reship to Arizona all of such articles as may be deemed of sufficient value, or possess sufficient interest to justify so doing, in order that they may be placed on permanent exhibition in the University Museum. I know of no way by which they can be given such a lasting and general value as this. The University Museum is just being established, and this would be a valuable acquisition to it. It will be in the main hall of the building, open every day and to all, and will undoubtedly be an object of great interest to visitors, and a valuable adjunct to the institution.

Third: Dr. Theo. B. Comstock, Director of the School of Mines, whose efficiency the Board recognizes as being of the highest order, and whose suggestions are received with the greatest respect, recommends in his report that provision be made for a Geological and Mineralogical survey of the Territory under the auspices of the School of Mines. The Board heartily endorses this recommendation, and I trust that steps may be taken at a very early day to enable the School of Mines to take up this work in the interest of the entire Territory.

Fourth: The act, as amended, establishing the University provides that its government shall vest in a Board of Regents to consist of a president and three members, and that it shall be the duty of the board to elect a Chancellor of the University who shall be *ex officio* President of the Board. As by virtue of his office of president the chancellor becomes a member of the Board of Regents, it has been held that his appointment as well as that of the other members shall come from the Governor. It has, therefore, been the practice for the Governor to appoint the chancellor in the same manner as the other members of the Board are appointed, and after having been duly commissioned by the Governor he is elected pro forma by the Board.

I would recommend that the offices of president and chancellor be segregated, and that the law be so amended that the Board shall consist of four members, one of whom shall be elected president, and that the Board of Regents shall elect a chancellor who shall be a member of and the head of the University faculty. Before committing the Board to this recommendation I have given much thought to the question, and have carefully considered the effect of such a change. The suggestion has been made that it might be construed as detracting from the dignity of the position of President of the Board. Whether this be so or not has not been deemed by me of sufficient moment to be taken into consideration in determining the matter. The interests and success of the institution are paramount to, and should overshadow any considerations purely personal to the individual. I believe the best interests of the institution will be subserved by this change, and feel it to be my duty to so recommend. As at present constituted it is not possible for the President to devote to the duties naturally coming in the line of the Chancellor that degree of constant attention that the position demands. The Chancellor should reside directly at the University, should be closely identified with, and be at the head of the faculty, of which he should be a member, and as such its immediate representative to the Board of Regents and the public. Under the present system the Chancellor is not closely identified with the Educational Department, which is now represented by two Deans of equal rank; and, however satisfactory this condition may be at the present moment, the fear is entertained that circumstances may arise that might embarrass the Board, and be productive of a confused state of affairs. There should be a single head of the College from an academic standpoint distinct from the head of the governing body. He should, however, be elected by the Regents in the same manner as they elect

any other member of the faculty. The Chancellor should be what the word implies; chief of the college staff, not a member of the Board of Regents, but amenable to the Board. From this change would result a division of labor between the Chancellor of the University and the President of the Board, a desideratum that would relieve the President of some of the onerous duties now imposed upon him as Chancellor.

The change from our present method of University government will not affect the cost, nor require any additional appropriation. What is required is simply a change in the law as it now stands that will enable the Board to effect the change in the system.

CONCLUSION.

In concluding I beg to call your Excellency's attention to the reports of the different members of the University Faculty and Experiment Station staff, to be found in these pages, to the various financial statements, and exhibits of receipts and expenditures, and to the inventories of property, real and personal, belonging to the University. I have made the report somewhat full in order that I might, if possible, give a clear and comprehensive understanding of the institution as it is. What has been done so far has been, in fact, but the laying of the foundation upon which to build; the laying of the foundation, however, may not be the less difficult part of the task of erecting the structure. There can now be no question as to success; that has already been determined. The opportunity is now presented to the entire Territory to profit by what has already been done, and it is the earnest wish of the members of the Board of Regents that the facilities and advantages that have been provided may be fully availed of by all.

The liberal monied endowment by the general government, which in a few years will amount to $40,000 per annum, the land endowment of the seventy-two sections already received from the government, together with the additional 100,000 acres to be received under the statehood appropriation, will render the University nearly, or quite independent of state aid, and its numerous advantages free of any burden of taxation.

Very respectfully,

MERRILL P. FREEMAN,

Chancellor and President.

University Report of Theo. B. Comstock, Chairman of Faculty.

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UNIVERSITY OF ARIZONA,
Tucson, Ariz., Dec. 15, 1892.

Hon. M. P. Freeman, Chancellor:

MY DEAR SIR: I have the honor to hand you herewith my report upon the present condition and prospects of the University of Arizona, considered as a whole.

The Chairmanship of the Faculty, the duties of which position were ably performed last year by Professor Gulley, Dean of the School of Agriculture, has this year been added to my responsibilities, and this report is intended to cover the matters which come directly before me in that capacity. In my capacity as Director of the School of Mines I make separate report covering that particular college.

It is not necessary for me to particularize concerning the work in the various departments in the University. The character of the equipment, the facilities for instruction and the nature of the work done by each Professor is given in the individual reports and in the reports of the Deans which are made to you at this time. These reports give a very clear idea of the distribution of the fund received from the National Government. This fund, largely appropriated by the Board for the equipment of the various departments under the direction of the Deans of the two Schools, has been by the latter apportioned according to the needs of the several departments, and all moneys have been conscientiously and economically expended.

STATUS OF THE UNIVERSITY.

All institutions must undergo a certain period of probation in order to demonstrate to the public their necessity, and to prove the propriety of the plans made for their operation. Every institution of

this character has also its own peculiar difficulties to meet, and its growth must necessarily be gradual, unless provided at the outset with almost unlimited pecuniary resources.

The University of Arizona has gone through more or less of the trials incident to its formative period, and although no member of its Board of Regents or of its Faculty is satisfied wholly with past accomplishments, it may be safely claimed that very few other educational institutions with its limitations have accomplished more in the short time it has been in operation.

The Territorial enactment establishing the "University of Arizona" provides (Sec. 10) that:

"The University shall consist of five departments:

FIRST—The Department of Science, Literature and the Arts.

SECOND—The Department of Theory and Practice and Elementary Instruction.

THIRD—The Department of Agriculture.

FOURTH—The Normal Department.

FIFTH—The Department of Mineralogy and the School of Mines."

Since the date of the passage of this organic Act, the Territorial Legislature has made wise provision for the Fourth, or Normal Department, by establishing an excellent school of this character at Tempe. It would, therefore, be injudicious to duplicate this work with our limited income.

The First Department is not overlooked in the organization of the University, although no distinct College has yet been formed. Our instructors are meeting all present needs of students in general science, and contemplated arrangements will cover the demands in English Literature, etc., as rapidly as these become apparent.

The Second Department is also liberally provided in the well conducted Normal School at Tempe, within the scope of which it naturally comes.

The Third and Fifth Departments, representing the great vital industries of the Territory, are those which have first claimed and received attention, and these, too, are the ones for which the National appropriations are specifically made. These appropriations constitute the bulk of our resources.

The income provided by the Territory is necessarily used largely for purposes to which the United States funds cannot be diverted, un-

der the statute. This restriction has caused the work of the University to be chiefly comprised within the scope of the two Schools, or Colleges, of Agriculture and Mines, which are now well equipped and officered as fully as the needs of the students have thus far required. Under the direction of the Deans, a Faculty of earnest, able and enthusiastic instructors has been gathered together, with whose efficient aid an equipment has been procured in as many departments, which will stand comparison, everything considered, with that of colleges of much greater age more favorably situated. The United States Agricultural Experiment Station, and the Territorial Station of the United States Weather Bureau, are also located at the University, but each of these is provided with its special fund, and neither is subject to the control of the University Faculty.

As will be seen from the foregoing, the funds of the University are necessarily appropriated to particular uses, according to the sources from which the income is derived. The equipment of apparatus, machinery and appliances for work in the laboratories, and much of the illustrative material used in the class-rooms, are purchased from the United States Fund, and very little of this class of material is supplied from the Territorial Fund. The salaries of Professors also come mainly from the National Fund. Were it not for this liberal National appropriation, it would be impossible to carry on the work of the University at present.

The aggregate of both funds gives a temporary endowment about equal to five per cent only of the available resources of a number of prominent Eastern institutions of learning, and several of these are very much better provided. It cannot, therefore, be expected that the University of Arizona will immediately acquire a position enabling it to rank among the first in the country, but a fair beginning has been made; and with the staff of workers now engaged, the limit to our growth will only be set by the measure of encouragement which is given by the Legislature and the people of the Territory.

The School of Agriculture, under the direction of Prof. F. A. Gulley, its Dean, is enabled to compensate its instructors, in some degree, from the special fund of the Agricultural Experiment Station, by using members of the Station staff in the work of teaching.

The School of Mines has no claim upon the Station Fund, and it is, therefore, obliged to rely wholly for its support upon the National College Fund and the Territorial appropriation, with such insignificant revenue as it may earn in the testing of ores, etc., which last cannot

be expected to do more than pay the expenses of a portion of the work thus performed.

The experimental investigation conducted in both schools, although not under Faculty jurisdiction, is regarded by the Deans, as well as by the Board of Regents, as one of the most important features of the University. This work is performed under the supervision of the Directors of the Agricultural Experiment Station and of the School of Mines, respectively, as independent organizations. Full credit is given to each member of the staffs for his individual labor, in the Bulletins which are periodically issued from both offices. A clear distinction is observed between the functions of the Professors, as instructors and as investigators.

PLAN OF ORGANIZATION.

The several Schools of the University are constituted independent Colleges of equivalent rank, and the Board has formally placed the responsible management of each in the hands of a Director, who is charged with the duty of organizing, equipping and conducting the work of his own college. Each school, or college, is made up of several Departments, under the charge of different Professors.

Each Director, with the approval of the Board of Regents, lays out the plan of his college, selects his Professors and other assistants and procures the necessary equipment, with the advice of heads of departments, acting as Dean of his Faculty, and generally as the executive head of the college which he supervises.

The University Council is made up of the Directors of the several colleges, one of whom is annually chosen Chairman, or Dean, of the University Faculty. The Council has general executive jurisdiction in matters affecting University policy, and is especially charged with the assignment of work which is equivalent in two or more colleges. This arrangement prevents duplication of labor on the part of the instructors.

The University Faculty is composed of all the Directors, Professors and Acting Professors in the several colleges. Assistant Professors and Instructors are non-voting members of this body. The Faculty has immediate supervision of the discipline and routine work of the students, much the same as in other institutions of learning.

The Students are arranged in several groups, occupying diverse positions as regards their mutual relations, but all being amenable to the authority of the University Faculty.

A. UNDERGRADUATE STUDENTS are classed as :

1. *Regular*—Regular Students are those who are pursuing courses of study leading to degrees. All questions pertaining to their entrance, class-standing, discipline, and the like, are adjudicated by the University Faculty.

2. *Special*—Special Students are such as are pursuing particular lines of study under the advice and supervision of the University Faculty or its committees, or under the direction of one of the colleges or its Director. The General Faculty makes regulations also for the government of these students.

B. POST-GRADUATE STUDENTS comprise all those who are pursuing advanced courses of study under the direction of members of the Faculty. These must be graduates of the University of Arizona or of institutions of equivalent rank, and in all cases work is laid out in advance for their guidance.

C. FELLOWS may be selected by competition from post-graduate students or others of sufficient preparation, who may engage in particular lines of advanced studies. These are expected to assist to a limited degree in the instruction of the lower classes, for which services a moderate financial compensation will be afforded.

DEGREES.

Students who have successfully pursued any of the regular courses of study announced in the catalogue of the University will receive the Degree of Bachelor of Science (B. S.), the diploma giving evidence of the particular line of work undertaken.

Advanced Degrees for Post-graduate students, who have successfully complied with the requirements of the Faculty after graduation, are given in both Schools. These are Master of Science (M. S.), Civil Engineer (C. E.), Mining Engineer (E. M.), Irrigation Engineer (I. E.), and Metallurgic Engineer (Met. E.)

PERSONNEL OF STUDENTS.

The number of students last year (including those in the Preparatory Department) was thirty-two, all told ; this year we already have thirty-nine students in regular attendance. Especially in new institu-

tions the number increases throughout the year, and we have had so many applications that it is safe to estimate a very considerable gain between now and the end of the scholastic year.

At present we have a large Freshman class and a number of Sophomores. When we have been running long enough to get Junior and Senior classes, we shall undoubtedly have as many students as our present facilities will enable us to carry.

The preparation of applicants for admission to the University is not all that could be desired. We have been obliged to lower our standard more than is advantageous, but this is incident to all new Institutions. The difficulty is in a measure overcome by the establishment of a Preparatory Department, which is intended as a means of temporary relief.

Technical work, such as we are undertaking, requires for its successful prosecution a good knowledge of Mathematics; and this, we find, is one of the branches in which entering students are commonly deficient. It being necessary to devote a large portion of the time to scientific and practical work, the opportunities for the study of English in the technical courses are somewhat limited. It is, therefore, very desirable that preparation in this particular also should be thorough in the public schools. Deficiencies cannot well be made up in these branches after entering the University.

The discipline among the students has been generally good, with the exception of a noticeable want of easy adaptation to the methods of work in a University. This arises chiefly from the novelty of the Institution and the necessary freedom from petty restraint in the government. While it is necessary to maintain a careful supervision and watchfulness over the morals and manners of students, the Faculty do not consider that it is any part of their duty to establish a system of police or of espionage. Every member of our staff is too busily occupied in the work of his department to act as a spy or monitor among the students.

The one governing principle of the University discipline is to treat the students as young men and women capable of being placed upon their own honor and entrusted with the government of themselves. Those who cannot, or will not, prove themselves worthy of such confidence have no right to enjoy the privileges here afforded, and such will be removed before their examples have contaminated their associates. Fortunately we have had no difficulties of this kind to encounter.

SOME THINGS NEEDED.

The scope of instruction in the University is necessarily restricted mainly to such branches as come within the technical needs of those pursuing courses in Agriculture and special branches of engineering, as Mining, etc. There has been some demand for training in Literature and in subjects appertaining to a Business Course. So far as has been possible these wants have been met by allowing students to select special courses of study not leading to degrees. But there is a limit to this procedure which is set by the physical inability of our Professors to bear any greater burdens than those they now have, and by the impossibility of providing a larger force of instructors with our present income. At the same time there is a strong disposition to meet any legitimate wants of this character, and we have thus far been enabled to accomplish all that has been really required of us. It is probable, however, that in the near future some provision will have to be made to cover a little wider range of subjects than those which we can now handle to the best advantage.

There is a discrepancy in the number and grade of instructors in the School of Mines as compared with the School of Agriculture. This necessarily throws a much increased amount of labor upon the Director of the former School, but it is most seriously felt in the direction of the obstacles which it places in the way of his investigations of the mineral resources of the Territory. Owing to the courtesy and good will of the Dean and Professors of the latter School this drawback has been very materially lessened, and the aid which they have rendered has so far overcome much of the difficulty. They have been enabled to do this, in part, through the advantage offered by the Agricultural Experiment Station Fund. But as the work of investigation in the School of Mines is deemed as important as in the School of Agriculture, it is a matter of concern lest the lack of special appropriation for this purpose may so cripple the energies of the Mining School that it may be unable to accomplish all that its Director desires.

THE UNIVERSITY AND THE PUBLIC SCHOOLS.

It is the strong desire of the Deans and Faculty to establish and maintain a close relationship between the Public Schools and the University, and we hope we have in a measure succeeded in this respect. The writer has been so much occupied during the past year with the

executive work of the School of Mines and with other duties in which he has had no assistance, that his own work in this direction has been perforce neglected, but this has been from no lack of deep interest in the movement; nor has this been cause for regret, considering the efficient work of Prof. Gulley and others of the Faculty, who have labored faithfully in this regard. For the future I can pledge the best efforts of my associates and myself to this most desirable end, and we respectfully solicit thoughtful suggestions from any and all teachers in Arizona.

UNIVERSITY EXTENSION.

In the Eastern States, and in the West as well, there has recently grown up a strong sentiment, amounting to a demand, for what is now popularly termed "University Extension Courses." The idea, in brief, is the conducting by the University of courses of lectures and classes for the people under simple regulations, by which means those of mature age can be afforded opportunity for general instruction in the results of knowledge in various departments of learning.

These Extension Courses are not intended to take the place of that thorough study which trains and develops the mind; but their object is to give to earnest men and women the chance to grasp, as a whole, the fruits of the labors of specialists, and thus to spread abroad a more general knowledge and to bring within the reach of the greatest possible number such advantages as arise from the presence of a body of learned men.

The amount of time and labor required for this important work is not always justly appreciated by the general public. For this reason, in Arizona at least, it becomes a necessity that the people themselves manifest a real desire for such instruction, as a precedent to definite action by the Faculty. In various ways we have endeavored to determine whether such a need exists in the Territory, and, so far as our limitations permit, efforts will be made to meet a demand of this character.

This year we begin a small experiment in this direction by arranging at the University, on alternate Thursdays, at 3:00 p. m., a series of addresses by members of the Faculty and invited speakers, the intervening Thursdays to be given to rhetorical exercises by our students. The degree of success of these addresses must be a guide to further attempts towards University Extension. In this course the Professors will endeavor to bring before the general public results of popular in-

terest in their particular lines of work. At present it is not the intention to establish systematic courses of study in any department for this purpose, but, if there should be a demand for work of this kind, it is probable that some arrangement could be made to meet it.

CONCLUSION.

There is nothing but commendation to be given all the Professors and other instructors for their zeal and efficiency. The necessity, in the infancy of the University, for selecting men of ability, both in the line of instruction and in that of origiual research, calls for an order of talent which is not necessarily combined in one individual; but the success with which our Faculty has worked, without exception, in both these fields, is matter for much congratulation. There need be no fear, with the present Staff, but that the work of the University and that of the Experimental Laboratories alike will be conducted faithfully and persistently for the best good of the highest interests of the Territory.

Full details concerning the requirements for admission to the University, and statements of the Courses of Instruction, as well as complete information regarding the different departments, are given in the University Catalogue.

Thanking you and the Board of Regents for the constant aid and encouragement which you have freely given, and which is the reason, in very large measure, for such success as has already been attained, I am, Sir,

Very respectfully yours,

THEO. B. COMSTOCK,

Chairman University Faculty, 1892-93.

First Annual Report of the Director of the School of Mines.

....

TUCSON, ARIZ., Dec. 15, 1892.

Hon. M. P. Freeman, Chancellor of the University of Arizona:

MY DEAR SIR: I have the honor to present my report upon the operations of the Arizona School of Mines from the date of its organization to the present time, together with such recommendations as seem to me warranted by the progress thus far made in our work.

The aims and objects of this School and the degree of success with which they have been carried out are largely matters of record in the Bulletins which have been issued from this office. The accompanying report is therefore confined largely to the consideration of such subjects as have not heretofore been brought to public attention.

ORGANIZATION.

The School of Mines constitutes one of the independent Colleges of the University of Arizona, being placed by the Board of Regents upon equal footing with the School of Agriculture and such other Colleges as may at any time be formed, according to agreement made with the Director upon assuming charge in June, 1891. So far as the funds available for strictly University purposes are concerned, this equality has been maintained since the inauguration of the School of Mines. The School of Agriculture had some advantages in an earlier start of more than one year, and in the opportunity to draw in part from another fund for the payment of salaries. This discrepancy has been balanced, however, in large degree, by the much greater contribution to the instructing force by the School of Agriculture, and by other concessions from the same source. We have, therefore, been able to prepare for much desired work in investigation, which has been a very prominent part of our enterprise since its inception.

My active duty as Director of the School of Mines began August 15, 1891, upon the termination of leave of absence granted me by

the Board for the purpose of completing work upon which I was engaged at the time of my appointment here. About one month was devoted to an extended trip, visiting manufacturers and preparing plans and estimates for the equipment of this School. Returning to Tucson in September, 1891, I have since been constantly engaged in work at the University, and in investigations bearing upon the same in different parts of the Territory.

The courses of study in the School of Mines are arranged, as nearly as circumstances will permit, to correspond with those of the best eastern mining schools. We have to meet peculiar needs in the west, and it is not possible to reach an ideal all at once; but we are making progress, and intend always to grow. The number of students already registered in these courses is unusually large for so young an institution. A number of applications have also been received from well prepared young men in other States who desire to acquire their engineering education in a mining region. Believing it to be improper to provide for such demands in advance of the requirement of students from the Territory, I have not encouraged foreign students to come here. The chief reason for this, however, is the necessity of arranging for higher classes than any we have yet been obliged to form for our own students. One or more years later we may be able to take such applicants, perhaps making a moderate charge for their tuition.

EQUIPMENT.

Aside from the irregular sums specifically appropriated by the Board from the Territorial Fund for buildings and special uses, there was appropriated prior to June 30, 1892, from the College Fund (U. S.) for the School of Mines the sum of twenty-one thousand five hundred dollars ($21,500).

The total expenditures from this appropriation to July 1st, 1892, were	$17,463 84
Leaving unexpended July 1st, 1892	$4,036 16
Add gross appropriation, ½ College Fund for fiscal year ending June 30, 1893	$9,000
Total available for all purposes for current year to July 31st, 1893	$13,036 16
There has also been received from work in mill and laboratory to October 31st, 1892	194 20

The November receipts have been somewhat larger in proportion, and the income from this last source appears to be gradually increasing, although it is not liable to assume much importance as a source of revenue.

The following summary of expenditures to November 1st, 1892, shows how the trust committed to me has thus far been executed. The different departments have been supplied as below:

1. Mill machinery, including boiler and engine, fittings for steam supply, freight and all labor for setting, and supplies of all kinds	$8,408 72
2. Metallurgic Laboratory, Assay and Balance rooms, including fittings, apparatus and supplies	1,759 85
3. Electrical apparatus, including engine, dynamo, motors, lights, fittings, etc., storage battery and supplies	1,295 00
4. Photographic Department, including fitting of dark room, cameras, lenses, projection apparatus, supplies, etc	502 60
5. Library and periodicals	421 39
6. Drawing Department, instruments and supplies purchased prior to November 1, 1892	236 15
7. Freight, etc., Department Geology and Mineralogy	83 61
8. Traveling and miscellaneous expenses connected with trip procuring equipment, and in visiting mines, including outfit for camping, etc	436 93
9. Salaries and general expenses including part compensation of officers of the Board, engineer, stenographer, etc., and total compensation of Director and staff for fifteen (15) months from July 1st, 1891, to November 1st, 1892	5,836 51
Making a total of	$19,081.60
The fund available from the United States appropriation for the fiscal year ending June 30, 1893, added to the small amount of earnings of mill and laboratory, already mentioned, gives an available resource for the current year of	$13,230 36
Of this amount, there was expended for all purposes, to October 31, 1892, the sum of	2,418 94
Leaving unexpended November 1st, 1892	$10,811 42
From this last amount must come the regular running expenses of the School of Mines, including fixed charges, amounting, in round numbers, for the time specified, to	6,000
Leaving a balance available for equipment and contingencies, of only	$4,811 42

This moderate sum in excess of fixed charges will be expended by the Director in fitting up the new Physical Laboratory, supplying a good equipment of drawing tables for both Free-hand and Mechanical Drawing, and adding some much needed machinery to the mill. Owing to the excessive cost of freight and large amount of labor involved in properly fitting up rooms for the reception of apparatus, and other calls upon our funds, it will be difficult to accomplish even the limited amount we have undertaken within the means at our disposal. If, before the close of the year the Board can see its way to partially reimbursing the cost of the electrical plant, (much of which is arranged for the lighting of the building) from the Territorial Fund, the facilities may be thereby somewhat extended.

The expenditures grouped under the nine foregoing heads cover all expenses for labor, freight, equipment and all running expenses of the School of Mines for the period indicated. But the equipment procured and the character of the work performed, are very imperfectly outlined by the gross sums. We have been highly favored by donations, and by unusually large discounts from manufacturers, so that the aggregate value of the machinery and apparatus now in our possession is itself considerably more than twenty thousand dollars ($20,000.)

The reduction in cost, as shown above, has been due to a process of competition among manufacturers, involving heavy correspondence and a large amout of office work on the part of the Director. The largest part of this was done without assistance, and this must be offered as an excuse for the apparent neglect of certain less necessary duties, to which, it is hoped, more attention may be given in the future.

Had we been able to obtain liberal concessions in freight a much greater saving could have been effected. This item amounts to nearly twenty per cent of the whole cost of equipment, and on some portions of the machinery the freight charges were above forty per cent. of the value of the goods.

SUGGESTIONS REGARDING LEGISLATION.

In its University relations the School of Mines will probably need no special consideration beyond what may be deemed proper for its sister schools. But there are demands upon the time and talent of our Staff, which we are by no means prepared to meet. These arise from the duties of investigation and experimentation with reference to the mineral resources of the Territory, and the industries which are based upon them. We desire most thoroughly to meet these demands, and

we have done and will do all that our means will permit. The lack of any special fund for this purpose limits our accomplishment in this direction, and yet we have such a foundation and such facilities that with a comparatively small fund in addition for salaries and the special equipment necessary, we should be able to undertake very much more, and thus make far better use of what we have already acquired.

Could some plan be adopted for the inauguration of a Geological and Mineralogical Survey of the Territory, under the auspices of the School of Mines, the prosecution of such work will come directly in our line. If a fund were available for the purchase of an equipment for the necessary field parties, and a moderate sum for salaries, the Director could readily double the efficiency of the School, both in instruction and investigation, at an added cost insignificant in comparison with the expense of maintaining either work by itself. At present such an enterprise is impossible. We are doing all that our resources will permit when we faithfully perform what we have in hand.

A Survey of this character, being wholly in the interests of the people of the Territory, should be conducted at their expense. The vast area to be covered and the difficulties of transportation will necessitate comparatively slow work, and no detailed plan of operation should be completed without a preliminary review of the whole region. This work could be performed during the first year, and I have already gone over a considerable area, partly with this object in view. To accomplish it thoroughly and without delay demands that I should have more assistance at the University and special assistance in the field. The instruments which are necessary are also unavailable with our present resources.

I therefore respectfully recommend that the Territorial Legislature be asked to appropriate a moderate sum to be at the disposal of the Director for this particular purpose.

BULLETINS.

The scope of the work of investigation and the aims of the Director have been clearly stated in Bulletins Nos. 1 and 2 of the School of Mines and in the catalogue of the University. The preparation of the Bulletins involves much extra labor, and I have not yet been able to arrange for issuing them with strict regularity. An attempt was made to publish one every six months, but Bulletin No. 3 could not be brought out October 1st, as intended. This issue, in which it is proposed to discuss the mining and treatment of a much neglected class of Arizona ores, will be published February 1, 189[illegible]

TRIPS AMONG THE MINES.

During the past summer I devoted three months to trips of investigation among the mines of the Territory. The cost of these tours was very inconsiderable compared with the knowledge gained of Arizona's resources, so far as the country could be covered in that time. Material was gathered for elaboration and discussion in future issues of the Bulletins, and the forthcoming issue of that publication is based very largely upon my observations made in these trips.

My inability to continue these trips since the first day of September, owing to the pressure of duties at the University, has been matter of great regret to myself, and I shall bend every effort for a renewal of this work at the earliest opportunity.

LECTURES, ETC.

There has been some call for an extension of the work of instruction in this School, so as to include lectures upon subjects connected with Mining and Metallurgy, which may be made accessible to the public, or at least to persons interested. It is my earnest desire to do all that may be possible to meet any such demands. The exactions upon my time have hitherto made such work impracticable; but, if those who may stand in need of such advantages will make their wishes known, I shall endeavor to comply with their requests so far as may be possible, in any portion of the Territory.

There are several Professorships yet unfilled which will have to be provided for in some way in the future. With this increased Staff of associates our facilities in these regards, as well as in others, will be very much extended.

THE TESTING LABORATORIES.

The machinery and apparatus already procured, with that to be purchased from time to time, place us in good shape for making working tests of ores by any of the more common processes. We have for some time been receiving samples in large and small quantities, and we can promptly handle almost any class of ore in lots varying from hand-specimens to carload shipments. If many who now allow themselves to become the victims of the process-mongers would expend a very small percentage of the cost of their experience in tests at our works, they would much more quickly arrive at beneficial results. We are especially equipped for this duty, and as all our interests lie in the

direction of the miner's success, our investigations are made solely for their benefit.

Thus far we have examined and reported upon a large number of samples sent in from all parts of the Territory. It has been our policy to make the charges as low as is consistent with our means, and our receipts have not in any degree remunerated us for the outlay. This work is eminently practical, and is performed at considerable expense for wear and tear and consumption of material, as well as labor.

Assaying and similar work, which can be done elsewhere, is taken only at rates considerably in advance of the current charges in the Territory. This policy is adopted to avoid unfair competition with others, and experience shows that we do not in any way compete with them.

We receive a considerable number of samples for assay; but, as a rule, these are sent in order to procure our official certificate, which, for certain purposes, is deemed desirable. All our assays are made in duplicate, using quantities large enough to make sure of accurate results.

Experiments are constantly conducted in the Laboratory, with a view to the advancement of the Mining industry in the Territory. Some of these are general in character, as in the case of a set of experiments bearing upon the formation of mineral veins. But, for the most part, the investigations are of a purely practical character, relating to methods of ore treatment, or of the nature of analyses for the purpose of determining the extent and character of the mineral resources and their distribution. The occurence of minerals of importance hitherto unknown is in this way being made apparent, and eventually our work will prove of much benefit to the mining fraternity.

CONCLUSION.

If the work already performed in this School, in the class-room and the laboratories, has begun to justify the expenditures of time, labor and money, or if the efforts of the Director have accomplished a little of what he has keenly wished, a very large share of the credit must be given to the constant and intelligent encouragement which has generously been accorded by the members of the Board of Regents of the University. With esteem, I am,

Very Respectfully Yours,

THEO. B. COMSTOCK,

Director of the School of Mines.

Report of Dean of School of Agriculture and Director of Experiment Station.

* * * *

Hon. M. P. Freeman, Chancellor of the University:

SIR: I have the honor to submit the following report as Dean of the School of Agriculture of the University of Arizona and Director of the Agricultural Experiment Station and reports of Professors in charge of Departments.

The School of Agriculture was permanently organized in the fall of 1890, and I was elected Dean of the School, Professor of Agriculture and Director of the Agricultural Experiment Station September 1, 1890, and instructed by the Board of Regents to nominate members of the Faculty and Staff of the Experiment Station.

C. B. Collingwood, M. S., was elected Professor of Chemistry and Chemist of the Station October 1, 1890; V. E. Stolbrand, C. E., Professor of Irrigation Engineering and Mathematics and Engineer of the Station May, 1891, to assume his duties July 1st; J. W. Toumey, B. S., Professor of Botany and Entomology, and Botanist and Entomologist of the Station June 8th; L. E. Benton, Acting Professor of Horticulture and Horticulturist of the Station June 1, 1892; E. M. Boggs was elected to the Chair of Irrigation Engineering and Mathematics, and Engineer of the Station, September 30th, to fill the place made vacant by the resignation of Professor V. E. Stolbrand; all to divide their time between the work of the School of Agriculture and the Experiment Station; J. A. Heberly was appointed Assistant Chemist in the Station October 1, 1891; Mark Walker, Assistant Horticulturist in the Station, March 1, 1891; R. S. Stockton, Stenographer, January 1, 1892; R. J. Ferguson, Engineer, December 1, 1890; M. Moss, Foreman Phœnix Station, November 1, 1890.

At the time of the permanent organization of the School of Agriculture and the Experiment Station the University building was not

complete, and during the year 1891 to October 1st the several members of the Faculty and Station Staff were employed in work of the Station and fitting up Laboratories and procuring apparatus for the use of students.

The first term of the School opened September 30th., 1891, and closed June 2nd., 1892. At the opening of the School the University building was complete, and rooms, laboratories, apparatus, etc., ready for students.

COURSE OF STUDY.

The course in the School of Agriculture requires four years' work or its equivalent, and while designed to give especial prominence to the study of the sciences that pertain to Agriculture, it constitutes a general education, embracing, as it does, work in Mathematics, English, French, German and Spanish, and the Natural Sciences.

The study of Chemistry, Botany, Horticulture, and the use of water in irrigation receives special attention, and the class-room drill is supplemented by Laboratory and Field-work practice.

In addition to the prescribed work of thirty-five weeks in the University, students are required to spend three weeks at the Experiment Stations, and on the fruit farms of the Territory during the year, studying and practicing the details of experimental, and farm work, and irrigation, under the supervision of members of the Faculty.

Facilities are provided for instruction and practice in the several branches of Agriculture and Horticulture, and in surveying, leveling, general arrangements of farms, roadmaking, planning and constructing buildings and fences, care of machinery, laying out canals and ditches, measurement of water, etc.

The School is supplied with well equipped Chemical, Botanical and Entomological Laboratories, and a full set of engineering instruments, including those especially designed for Irrigation and Meteorological work.

Provision is made for two regular courses leading to the Degree B. S. (Bachelor of Science), and advanced studies leading to the Degrees of M. S. (Master of Science), C. E. (Civil Engineer), and I. E. (Irrigation Engineer). In addition to the regular courses of study, facilities are provided for those wishing instruction and practice for a few weeks in surveying, leveling, laying out places, planting, budding, grafting, etc., work which requires skill and special training, and some knowl-

edge of which is almost indispensable to many whose time will not permit taking a college course.

For details see reports of heads of Departments and inventory of apparatus.

THE AGRICULTURAL EXPERIMENT STATION

Is a Department of the School of Agriculture, and the members of the Faculty of the School have been selected with reference to the work of investigation as well as instruction.

Four Stations have been established in different parts of the Territory, and an extensive variety of fruits and other plants are being tested to determine their economic value.

The Experiment Station is making an exhaustive examination of the irrigation waters used in the Territory, and of the soils of the farming country. Bulletins are issued quarterly giving results of work, and sent free to any applicant. Six have been issued to date: 1. Organization. 2. Notes on some of the Range Grasses of Arizona, and Overstocking the Range. 3. Irrigation in Arizona. 4. Waters and Water Analyses. 5. Canaigre, and 6, Soils and Waters.

It is the design of the Experiment Station to undertake investigations that will tend to advance the Agricultural industries of the Territory.

For the purpose of testing the growth of a large number of varieties of fruits and other plants on different soils, branch stations have been established in several localities and work started in a practical way that may be of interest in the vicinity; but the principal work of the Station for the present is the investigation of questions of general utility such as may be of value to the development of the Territory at large. An examination of the waters of the Territory used in irrigation to determine their value for this purpose is under progress, which embraces a daily analysis of the river waters used by the principal canals. The samples of water are taken from the streams, but the analyses are made at the University, where a Chemical Laboratory has been equipped with all the modern appliances for this work. Closely allied to this is the work in examination of soils to determine their agricultural value and best method of improvement, and reclamation of salt lands.

Examinations of well waters, to determine their value for domestic use and for irrigation, occupies a good deal of the time of the Chemist,

who receives frequent inquiries on this subject. These examinations are made free of cost to the applicant. Samples of soil and rock that are thought to have value for fertilizing purposes, making cement, fire clay, pottery, etc., are frequently received and receive prompt attention. All work of this kind that may develop something of value is solicited, as it is the purpose of the Station to aid in the development of all the resources of the Territory and further its interests in every possible direction.

The introduction of new varieties of useful plants and testing them, the study of injurious insects with reference to their suppression, treatment of plant diseases, are all included in the work of the Station.

During the past year special attention has been given to the Canaigre plant, both in field cultivation and chemical study, and our experiments show that this plant may be made one of our largest and most profitable crops.

An investigation in the use of water in irrigation to determine, if possible, how much water is actually required, and when and how it should be applied, is under way; this will include, as our means permit, measurements of the flow in rivers and how best to secure distribution with least loss.

The Agricultural Interests of the Territory depending so largely on irrigation, the study of the use of water will be made the prominent feature of the Station work.

The Live Stock Industry of the Territory being important, attention will be given to the growing of forage crops for meat and milk production and feeding tests. A beginning has been made the present winter to learn the comparative value of sorghum added to alfalfa hay for fattening cattle. A carload of steers has been divided in three lots of seven each; one lot is fed on alfalfa hay alone, one on sorghum and one on alfalfa and sorghum mixed. Results will be published at close of the test.

A Station was partially equipped at Blaisdell, near Yuma, in the Gila Valley, in the Fall of 1890, but owing to the destruction caused by the flood of the following spring, the place was abandoned.

Through the courtesy of Mr. H. W. Blaisdell, Manager of the Yuma Heights property, who has provided land, water and other facilities for carrying on the work, this Station has been reorganized and work begun on Yuma Heights some eighty feet higher than the Colorado River and one mile from the city limits.

At this place special attention will be given for the next two years

to the growing of early vegetables and fruits for marketing outside of the Territory.

All inquiries on any subject will receive prompt attention and correspondence is solicited.

It affords me pleasure to state that the efficiency of the work of the School, and of the Experiment Station, is due to the hearty cooperation and diligent labor of the several members of the College Faculty and Station Staff.

In ability in their special lines of work and in enthusiastic prosecution of their duties the men with whom I have the pleasure to be associated are the peers of those connected with any institution in the country.

Respectfully Submitted,

F. A. GULLEY,

Dean and Director.

Dec. 12, 1892.

Report of Principal of Preparatory Department.

* * * *

Dr. Theo. B. Comstock, Chairman University Faculty, University of Arizona:

SIR: I hereby submit the following report as principal of the Preparatory Department of the University of Arizona:

The object of the Preparatory Department is not to supply the place of the public school in the education of the student. Its aim is to give those who have not had school advantages sufficient to enter the University proper, a training which will enable them to pursue the technical courses of either of the University schools. The course of study in this department extends through one year, and those completing it are admitted to the Freshman Class of the University without further examination. The students taking this course are under the control of the University Faculty, and are subject to the regular discipline of the institution.

The subjects taught in this department during the past and present years are as follows: Arithmetic, Algebra, English, Physical Geography, Writing and Drawing.

The study of Arithmetic extends through the Fall and Winter Terms, covering the principles of the science up to the point where they can be better explained by Algebra. Special attention is given in the study of Arithmetic to the analytical method, for the purpose of developing the reasoning powers of the student. Algebra is taken up in the third term, and the ground covered as far as fractions.

The study of English Grammar also extends through the fall and winter Terms, leading up to a more serious consideration of the subject during the first term of the Freshman Year. One hour each week throughout the year is given to the study and discussion of some American classic. The students of this department are also required to take part in the public rhetorical exercises, which, for them, con

sists in the delivery of declamations or the reading of original essays on subjects in American history or biography.

The subject of History embraces two terms of United States, and one term of Ancient History. Particular attention is paid to the growth of our institutions during the Colonial period. The course in Ancient History consists of an outline study of the ancient monarchies and of the progress of civilization down to the fall of the Roman empire.

Great stress is laid during this year's work, especially in English and History, upon the topical method of study and recitation. Its object is to train the student in a systematic method of presenting ideas. The logical sequence of events is carefully studied.

The object of the course in Physical Geography, pursued during the third term, is to make the student familiar with the causes of every-day Natural Phenomena.

Writing, taught during part of the first term, is intended not only to correct existing faults in penmanship, but to teach the student proper forms of correspondence and methods of conducting simple business transactions.

Free-hand Drawing is taught throughout the year. A well selected collection of models and plaster casts affords the student ample opportunity for practice. The special purpose of this work is to prepare students for drawing as studied in connection with Botany and other natural sciences, and also to prepare them for courses in Civil and Mining Engineering. Some attention is also paid to the drawing of Maps in connection with the study of History.

Having been appointed Instructor in English in the University at the beginning of the present school year, I would submit the following report of the work so far done, and what it is proposed to accomplish during the present year.

The Freshman students in both of the University Schools take up the more serious and technical study of English Grammar during the fall term. As far as possible, the inductive method of study is used. The more difficult constructions of Syntax receive special attention, and the topical method of study is insisted upon.

During the winter term a course is given to the Freshman Class by means of text-book and lectures upon the elements of Rhetoric, its practical object being to instruct students in the most effective method in the arrangement of sentences and paragraphs for the purpose of clear writing and speaking. It is also intended to enable the student to study profitably and appreciate, masterpieces of English Composi-

tion. One hour per week throughout the year, in addition to the above, is given to the reading and discussion of American Classics in prose and verse.

The Sophomore Class spend one hour per week in the reading of some one of Shakespere's dramatic works, three plays being studied in the course of the year.

The Student Public Rhetoricals, in charge of the Instructor in English, take place every alternate Thursday afternoon. The classes take part in sections, each student appearing three times in the course o the year. The exercises consist of essays or declamations on subjects connected in some way with other English work.

All of which is respectfully submitted.

H. J. HALL,
Principal of Preparatory Dep't,
Instructor in English.

December 15, 1892.

Report of Professor of Chemistry and Chemist of Experiment Station.

* * * *

Prof. F. A. Gulley, Dean of the School of Agriculture and Director of Experiment Station, University of Arizona:

SIR: As Professor of Chemistry in the University of Arizona, I have the honor to submit the following report:

From the time of my connection with the University in October, 1890, until the opening of the College year in October, 1891, I was occupied with work connected with the Experiment Station, as detailed in the Report of the Station Chemist to you.

At the opening of the College year in 1891 there was no regular class in Chemistry, but a special class was organized in the fully-equipped Laboratory of the Experiment Station, where they carried on their work for one year.

During the present summer (1892) a Laboratory has been fitted up on the second floor of the south wing especially for student use. This Laboratory is well lighted and thoroughly ventilated by the eight-inch terra cotta pipes reaching to the roof. The room is arranged for twelve students. The students pass from recitation chairs to desks supplied with gas and water. Each student has his own set of reagent bottles, drawers, lockers and apparatus.

Connected with the main Laboratory is a store-room and balance-room. The equipment comprises balances of precision, a polariscope and a spectroscope, cabinet of specimens, including specimens of the metallic elements and compounds, a large collection of carbon compounds and analine dyes and a collection of the tanning materials of the world. It is intended to supplement this until by means of collections and charts the great industries can be graphically represented. Advanced students can have access to the fully equipped Station Labora-

tory and become acquainted with the details of practical analytical work.

The course in Chemistry commences in the first term of the Sophomore year. Ten hours per week during the whole year Lectures, Recitations and Laboratory work for the students of both schools—Agriculture and Mining. The first two terms are given to Inorganic and the third to Organic Chemistry. In addition to experiments illustrating Theoretical Chemistry, the student receives instruction in Qualitative and Volumetric analytical work. During this year the student is prepared for future work in Applied Chemistry, whether in the School of Agriculture or School of Mines.

In the Winter Term of the Junior year the students in the Agricultural course will have five hours per week lectures and recitations in Agricultural Chemistry, commencing with a study of soils and tracing out the principles of plant growth. This subject will be continued during the Spring Term of the Senior year five hours per week, with advanced work on the subject of Plant Growth, Soil Exhaustion and Fertilizers.

THE EXPERIMENT STATION.

As Chemist to Arizona Agricultural Experiment Station I have the honor to submit the following report:

The month of October, 1890, was spent in the East selecting apparatus for the Laboratory of the Station. I arrived in Tucson in November, 1891, at which time the main building was in the hands of the contractor. There was, however, much to be done in making plans for changes in the building and in getting acquainted with the work in hand. Our climatic conditions necessitating irrigation make the problems to be solved entirely different from those in the Eastern States. In order to work intelligently, one must first become acquainted with the needs of this Station. During the Winter of 1890 and 1891 I made two trips to Phœnix, and one to Yuma, near which a sub-station was then located. Samples of soils and waters were collected and arrangements made for collecting samples of water from the Colorado River.

The large area of land in the Gila and Colorado bottoms, which will at some time come under irrigation is of sedimentary origin and principally of very uniform character. Experiments were started on the ranch of H. W. Blaisdell with a view of finding the best methods of reclaiming salty lands. The subsequent floods of February, 1891, destroyed the ranch and the prime value of the experiments was lost.

Some facts were, however, obtained which will prove of value in the future. In the meantime the apparatus ordered in the East began to arrive and was put in place. This included a gas machine with a capacity of one hundred lights. This machine, known as the Tirrill Vapor Gas Machine, has proved all that was claimed for it and has given excellent satisfaction. In June, 1891, I came into possession of the present well equipped Laboratory and commenced analytical work. Since then over seven hundred analyses have been made, two bulletins have been issued—one on "Water and Water Analyses," the other on "Soils and Waters," a report on the soil of Yuma Heights and the water of the Colorado River. The material for other bulletins is nearly completed.

In most of the prairie and forest regions of our country the soil is rich in organic matter and only needs to be properly cultivated to yield a good crop. With us the conditions are different. Most of our soils are deficient in organic matter and have an excess of soluble salts; added to this, it is only by irrigation that crops can be grown. Irrigation introduces new factors. Agricultural development must wait on the water; when water comes, a part of the farmer's success depends on a knowledge of the physical properties of the soil, permeability to water, etc., and on his knowledge of the chemical character of the soluble salts. It is then natural that the frequent inquiries on these subjects should have directed the thought and energies of this department toward the study of soils and waters.

The work that has been done so far is altogether preliminary, consisting of a knowledge of conditions and a formulation of plans.

Complete chemical analyses have been made of twenty soils, but it is thought best to postpone their publication until more complete data regarding the physical conditions can be worked out. A study of the physical conditions of soils is being carried on in connection with a chemical examination of the soluble material which the soil contains. Questions relating to the depth to which a given quantity of water will penetrate the soil; the effect of different waters on different soils; the amount of soluble matter which may be allowed to accumulate in a soil without harmful effect; and the best remedies for soils containing too much soluble matter, are being studied. There is a field here for much work, and some time must elapse before definite results can be published.

The subject of soil and water work was deemed of so much importance that the Chemist spent the month of February, 1892, in the Lab-

oratory of the California Experiment Station with Dr. Hilgard, getting acquainted with his methods. By using their methods the results of our work will be comparable with the large number of analyses which have, during the past fifteen years, been made at that Station.

The Chemist has been able to visit the site of nearly every irrigation enterprise in the Territory and in this way get some knowledge of the character and supply of water as well as extent and quality of the soil.

Intimately connected with the questions of Irrigation is the question of the effect on the soil of the suspended matter, or silt, in an irrigation water. These particles which float with the water are exceedingly fine, and in many cases an accumulation of this material is the one thing needed to bring a barren sand into a state of fertility. Analyses have been made of the sediment in the waters of the Colorado River. Daily samples were taken for that purpose from August, 1891, to February, 1892. Since that time daily samples of water have been taken and complete daily analyses made. Samples of water have been taken from the Salt River at the Arizona dam since June, 1892, and as soon as the work now in progress is completed, another bulletin on waters will be issued. This bulletin will include methods of analysis, a discussion of the value of water analysis for irrigation purposes and several hundred analyses of river and well water.

A large number of samples of water for domestic purposes have been sent in for analysis. These have received prompt attention, and in many cases methods have been suggested for improving the water for drinking purposes. The interest regarding water analysis is growing, as shown by increased correspondence on this subject. Often wide differences are found in the character of waters in the same neighhood. Corporations or private individuals seeking a new water supply would do well to send samples to this laboratory for analysis. All such work of a public nature is performed free of charge.

It sometimes happens that a wild plant contains marketable quantities of some substance useful in the arts. The root of the Canaigre *(Rumex Hymenosepalus)* contains a high percentage of tannic acid. It grows in the sandy lands along the river bottoms of Southern Arizona. As a wild plant it would be but an incident in the tannin trade. Two questions needed to be answered: First—Could it be cultivated. Second—How would cultivation affect the content of tannic acid? This Department undertook to supplement the work of the Director on Cultivation by undertaking a study of the Canaigre as a tannin producing plant. With the Director the Chemist made a wagon trip through

the valleys of the Gila and Salt Rivers, examining plants and soils and collecting samples for analysis. The result of the trip was most encouraging. It was found growing over a large area and containing a uniformly high percentage of tannic acid. While it is too soon to expect cultivation to show an increase in tannic acid, all experiments so far point to the fact that there is no decrease in tannic acid and that the full percentage is reached in less than twelve months from planting. The amount of tanning material in the world is limited; tanners already go to every part of the world in search of plants containing it. The values of the tanning materials used each year run up into millions of dollars. Canaigre will undoubtedly become a crop of great value to the Territory. Material is nearly ready for the chemical side of a bulletin on this subject.

The general work of the department includes analyses of sugar canes and sugar beets, analyses of bones, stable manure and ashes for fertilizers, and such general work as the nature of the experiments demanded, or has been from time to time brought to the Laboratory. Our equipment is sufficiently complete to enable us to perform any kind of analysis that is brought to us.

In July, 1892, the Meteorological instruments of the Station were turned over to this Department. The observations have been taken by Mark Walker, Jr., who has shown himself faithful and accurate. These observations will be tabulated and kept for reference, and such parts published as will be of general interest.

During July, 1892, in connection with the Director, I traveled through the Territory, as far north as the Grand Canon and gained much information regarding the Territory. The value of such trips to us as Station workers can hardly be overestimated. I wish to express my appreciation of the liberal spirit in which this need has been met, for without such opportunity intelligent work could not be accomplished.

It is due to Mr. Heberly, my assistant, that I express my satisfaction with his accurate, earnest and faithful work. Without such help it is would be impossible to perform the routine work connected with these investigations.

Appended is an inventory of apparatus and chemicals in the Laboratory of the Station. Respectfully submitted,

C. B. COLLINGWOOD,
Professor of Chemistry,
and Chemist of Station.

December 15, 1892.

Report of Prof. of Botany and Entomology, School of Agriculture and Experiment Station.

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Prof. F. A. Culley, Director of Experiment Station and Dean of the School of Agriculture:

DEAR SIR: I herewith submit a report of the work done and in progress in the Department of Botany and Entomology in the University and Experiment Station from the time of the organization of the Department until November 15th of the present year. Details of experiments and of other work of the Department, such as reports of field work and collections made, are only briefly noted, as they would otherwise encumber this report with much that would be of little interest outside of the Department.

Work began in the Department of Botany and Entomology in June, 1891, but it was October of the same year before the Laboratory was finished and equipped with necessary apparatus for Botanical and Entomological investigation.

Prior to this time some six weeks were occupied in field work investigating and studying the flora of South and Central Arizona. Large collections were made in the vicinity of Camp Verde, Phœnix and Tucson. The following winter this material was determined, mounted and now forms a part of the University and Experiment Station Herbarium. During the season of 1891 more than seven hundred species of flowering plants were added to the Herbarium.

Many other Botanical specimens, such as parasitic fungi, were collected, but from our lack of necessary reference books but little as yet has been done with this material.

BOTANIC GARDEN.

During the fall of 1891 a Botanical garden was started on the University grounds just north of the pumping plant.

It is our purpose to have this garden include, so far as possible, all the more interesting forms of our flora. Specimens of our native species of cacti have already been planted in considerable numbers, as well as a number of other hardy plants of interest to the student of Botany and to persons visiting our grounds. Specimens are being added to this garden from time to time as they are collected.

BOTANICAL COLLECTIONS MADE DURING THE SEASON OF 1892.

In May I received the appointment as Special Agent of the Department of Agriculture for the months of June and July to make a collecting trip over a large part of our Territory. The expenses of this trip were paid by the Department of Agriculture. A large part of the material collected has been sent to Washington; however, several specimens of everything found were retained for the University.

This material, which includes more than eight hundred species of flowering plants, will be determined, mounted, and added to our Herbarium as soon as possible. Two months were occupied in this trip, the route traveled taking us through the Bradshaw Mountains, San Francisco Mountains, north to the Grand Canon of the Colorado. Our return brought us by way of Baker's Butte, Natural Bridge and Tonto Basin. A report on the flora of the regions visited has been sent to Washington, but it is too lengthy to include here.

During the past season many Botanical collections were also made in the vicinity of Tucson, and in the neighboring mountains.

ENTOMOLOGICAL WORK.

During the year 1891 a number of collections were made in the vicinity of Tucson and Fort Lowell. A few insects were also collected on the trip previously referred to; however, lack of time made it quite impossible to give much time to this work. Mr. A. B. Cordley, Assistant Entomologist from the Department of Agriculture, accompanied me and made very extensive collections of insects in the localities visited. A set of these insects can be procured of Mr. Cordley at a nominal cost, and would be of much value to this Department.

Some attention has been given to Economic Entomology. As yet but little complaint has come to the Department in regard to insect depredation in different parts of the Territory. As more land comes under irrigation it is more than likely injury from insect depredations

will increase. Observations have been made upon a number of insects, injurious to vegetation, at the University Station, the results of which will shortly be embodied in a bulletin.

OTHER COLLECTIONS.

In addition to the collections previously enumerated, seeds of a large number of native grasses have been secured. These seeds will be sown and a trial made to determine if any of them will prove of value under cultivation.

Native grass sods have been collected from the neighboring mountains and valleys, and transplanted in plats on the University grounds that their relative value as forage plants may be determined.

EXPERIMENTS WITH GRASSES AND OTHER FORAGE PLANTS FOR THE YEARS 1891 AND 1892.

A series of experiments have been carried on for the past two years to determine the best native or foreign grasses to withstand our prolonged droughts. More than fifty species of grass and leguminous plants have been tried. They were in most cases irrigated that they might become firmly established. It was found that in all cases when the water was turned off, the grasses were unable to stand the long, summer drought. They do not completely die out in all cases, but a few scattering plants remain alive to be revived by the winter rains.

During the present year a number of the most promising of these grasses were sown at the Tempe Station. They were sown early and came up well after the spring rains. No water was turned upon them during the entire season. Before midsummer the drought had killed every plant, thus demonstrating the inability of growing even our hardiest grasses to advantage without more of less irrigation, the luxuriancy of growth depending almost entirely upon the supply of water.

During the present year under irrigation *Panicum Tenniffe* var. *Rosea* did much the best of all the species tried. With a moderate supply of water this species may be cut at least two or three times during the season. With sufficient water almost any of our grasses will make a good growth, but it has been clearly shown that without water none of the species tried will make a profitable growth, as a cultivated crop.

BOTANICAL AND ENTOMOLOGICAL WORK IN THE SCHOOL OF AGRICULTURE.

EQUIPMENT OF LABORATORY.

In the fall of 1891 the Laboratory for this Department was fitted up and necessary apparatus for work in these lines procured.

The inventory which is given at the close of this report will give an adequate idea of our facilities for class-work and original investigation in the Department. A fine cabinet containing nearly two thousand specimens illustrating the insect fauna of this country, especially the Southwest, is of much value to students in the study of Entomology. We are rapidly building up a fine Herbarium, which we purpose to soon contain the complete Phaenogamous flora of the Territory. This Herbarium already contains nearly two thousand species; more than half this number I collected the past two seasons in Botanical trips over the Territory; more than six hundred species I brought from the east and have since turned into the general Herbarium; the remainder, about four hundred specimens, were sent to the Department from the National Herbarium.

This Herbarium is deposited in two large, well-made cabinets, so that the specimens contained therein can be immediately referred to. It is of much value to students working in Systematic Botany, and in the determining of plants sent here for identification.

We are well supplied with necessary microscopes and other apparatus for class-room study. Eleven compound microscopes with modern fittings and accessories aid students in the investigations in the minute structure of plants and insects. A dozen simple microscopes (Zentmayer's stand) are for student's use in the study of Systematic and Structural Botany.

Dried specimens, seeds, and alcoholic materials are being rapidly added to our equipment, so that at all times this department is well supplied with necessary material to illustrate class work.

In the study of Economic Entomology, we are well supplied with spraying apparatus and insecticides, to illustrate the effectiveness of proper treatment in retarding and overcoming the effect of the ravages of injurious insects.

As yet our library is poorly supplied with necessary works bearing upon the subjects of Botany and Entomology. A few hundred dollars spent in books would add largely to the value of the work done in this

Department. I find it quite impossible to undertake much original investigation with the few reference books which I have at my disposal. I hope in the near future at least a part of the desired books may be procured.

TEACHING.

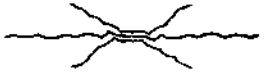
During the past school year I did teaching outside of my Department, in both the Freshman and Preparatory Classes, on an average during the year having more than three hours of class room work daily. By referring to the Catalogue the class-room work in this Department can be easily determined. During the present year I am also occupied with class-work in the Preparatory Department, and this, together with my botanical class work of two hours daily, occupies a considerable portion of my time.

Respectfully submitted,

J. W. TOUMEY,

Botanist and Entomologist to the University and Experiment Station.

Tucson, Ariz., Dec. 15, 1892.



Report of Professor of Mathematics and Irrigation Engineering.

* * * *

Prof. F. A. Gulley, Dean and Director, University of Arizona:

DEAR SIR: My brief connection with this institution does not enable me to report on the labors of the past year.

Since my arrival on October 10th, the work of the Department of Irrigation Engineering and Mathematics has consisted of Sophomore Geometry and Freshman Algebra; both of which classes are in their second term's work.

EQUIPMENT.

This Department is well supplied with instruments for practical instruction in both field and office work of the various lines of Engineering practice. It is also provided with special instruments for guaging the flow and recording the water-stages in streams, etc., designed to be used in the general investigation of Irrigation affairs in the Territory.

An inventory of all instruments is appended hereto.

BOOKS.

In addition to the miscellaneous books in the General Library of the University there is in this Department a well selected list of books on subjects especially connected with Irrigation.

A catalogue of these books is attached. This list is supplemented by the Private Library of the Professor in charge, but it could be greatly extended to good advantage were funds available.

EXPERIMENT STATION.

On attempting to comply with your request for a report covering the work of the Irrigation Engineer attached to the Experiment

Stations during the past year, I find it impossible to report fully on the work of my predecessor, whose connection with the work continued until September 30th, last.

The most important results of his inquiries appear to have been embodied in Bulletin No. 3 of the Arizona Agricultural Experiment Station, entitled "Irrigation in Arizona," and which treats of the following topics:

I. Sources of water-supply.
II. Canals of the Territory.
III. Pumping plants.
IV. Projected works.
V. Resources of certain counties.
VI. Duty of water.
VII. The "Miner's Inch."

Subsequently efforts were made to gather data for another Bulletin on Irrigation, and partial statistics of seventy-three (73) canals and six (6) pumping plants in Arizona were obtained. This information is too incomplete and uncertain for publication.

Regular observations in the branches of Meteorology directly related to Irrigation and Experimental work were taken during a portion of the year; the apparatus used and the record of results were transferred to the Chemical Department where they now remain, and where the observations are being continued.

Very Respectfully,

E. M. BOGGS,

Prof. of Mathematics and Irrigation Engineering.

Dec. 15, 1892.

Report of Acting Prof. of Horticulture and Horticulturist to Experiment Station.

* * * * *

Prof. F. A. Gulley, Dean and Director:

In accordance with request of Regents, I have the honor to make the following report:

The first annual catalogue of the University gives an outline of the work in instruction in this Department of the Agricultural College.

We have for illustration the plantings upon the College ground and although these are yet young they furnish a variety that is not found at many less favored places. There is no Horticultural Library, and a most pressing need is standard and special books such as can be placed in the hands of students and such as are almost absolutely necessary to keep up with the material that will shortly come in from the various Stations; at present we have only the reports from other States.

EXPERIMENT STATION.

I report to you progress from the time of establishment until the present time.

The first plantings upon the newly established Station were made during the spring of 1891. In the same spring the Station upon the Blaisdell tract was destroyed by the flood water of the Gila River.

All plantings were designed to test, in the best manner, the leading well known fruits of value and others of which there is reason to believe will succeed here. The selection was also made of Ornamental and Economic plants including shrubs, palms, shade and forest trees.

A list of varities planted includes

61 Apple,	45 Pears,	7 Quinces,
55 Peaches,	24 Cherries,	44 Plums,
12 Prunes,	9 Nectarines,	18 Apricots,
12 Almonds,	17 Olives,	36 Figs,
5 Pomegranates,	48 Grapes,	9 Dates,

And several varieties of nuts, a total of over 500.

A nearly equal number is now growing at each of the three principal Stations, those of Phœnix, Tempe and on the University grounds at Tucson. On a small piece of land given by Mr. A. V. Grosseta, of Tucson, some planting has been made which will be increased.

This orchard when completed will contain about 300 trees of best varieties.

The success of the plantings has not been that which could be desired. The loss, and consequently the number to replant, has been very large for both the past years. This has given rise to additional expense and, what is more serious, delay in obtaining results. Many trees starting feebly have not made a growth that is characteristic or that is of value in making a comparison with other varieties of the same kind. These results appear to have been due to several causes, some of which are unsurmountable and others of which have been partly, and, it is hoped, will be fully overcome. With the better facilities and the work more closely in hand, it is to be hoped that the results will more closely approach that which it is proper to expect.

The total expenditures for trees and plants for the year 1891 were $1,250 35, something over two-thirds being for fruit trees and the remainder for ornamental and shade trees and plants. In this year, or 1892, $368 16 has been expended in proportion about as above. For 1893 it is proposed to make some new additions to the present orchards and nursery at an expenditure of less than that of this year.

Records have been kept of all varieties planted thus far, the design being to get trustworthy results, giving the facts as to their behavior in the Territory and its different parts, and of their value as compared with their successful growth elsewhere. The same attention has been given to garden and ornamental shrubs and plants, and this it is proposed to give to any which we can obtain.

Close attention is being given to the subject of adaptation of the different kinds of fruit, this being a newly developing country, and having a special character of its own. Varieties of different types and different species of the same kind of fruit have been planted to furnish guides as to growth and behavior and for possible use in the future in the production of new varieties.

L. E. BENTON,
Acting Professor of Horticulture and
Horticulturist of Station.

Statement of Total Expenditures from the University Fund from the Establishment of the University to Date.

* * * * *

Printing, Stationery, and Advertising	$ 1,206 46	
Per diem of Regents	6,255 00	
Mileage of Regents	1,022 40	
Furniture	2,576 72	
Miscellaneous	2,269 26	
Postage	45 40	
Rents	584 50	
Architect's Plans and Specifications	1,307 15	
University Building	43,900 29	
Salary of Secretary	900 00	
Insurance	1,044 30	
Superintendent of Construction	803 22	
Buildings, Improvements and Repairs	3,852 72	
Legal	207 05	
Residence Buildings, No. 1 and 2	12,729 85	
Machinery Building	2,938 08	
Total		$81,642 40
NOTE—Of the above amount there was realized from the sale of the University bonds		$25,000 00
Premium on same		850 00
Tax levies		55,792 40
Total		$81,642 40

STATEMENT OF RECEIPTS AND EXPENDITURES AGRICULTURE EXPERIMENT STATION FUND FOR THE YEAR 1892.

RECEIPTS.

Government Grant	$15,000 00	
Sales of Laboratory Stock	1 25	
Sales of horse feed	148 90	
Labor account	18 00	
Sale of boiler	250 00	
Sale of wood	11 25	
Total receipts		$15,429 40

EXPENDITURES.

Balance carried forward from 1891	$ 168 67	
Miscellaneous	33 80	
Salaries	6,288 88	
Printing and Stationery	268 17	
Traveling and Incidental Expenses of Director and Staff	327 20	
Wagons, horses, harness, &c	5 50	
Implements	57 62	
Supplies	292 28	
Feed of Station horses and hired teams	699 12	
Labor	4,533 20	
Postage	38 50	
Repairs	177 19	
Maintenance	204 13	
Trees, plants, etc	363 21	
Library	1 30	
Apparatus	215 74	
Improvements	64 35	
Buildings	27 42	
Water privileges and allied expense	684 40	
Total expenditures		$14,460 68
Balance in the hands of the Treasurer of the Board on Dec. 31, 1892		$968 72

STATEMENT OF RECEIPTS AND EXPENDITURES COLLEGE OF AGRICULTURE FUND FOR THE YEAR 1892.

RECEIPTS.

Balance in the hands of the Treasurer of the Board on Jan. 1,1892	$ 6,420 02	
Received from Government Annuity	22,000 00	
Assays made for Public	192 13	
Transferred from University Fund	8 60	
		$28,620 75

EXPENDITURES.

Salaries	$14,329 36	
Library	932 37	
Machinery	3,603 24	
Laboratory Supplies	1,106 01	
Laboratory Stock	1,789 69	
General Apparatus	4,248 85	
Printing and Stationery	142 90	
Miscellaneous	71 29	
Machinery operating expense	1,074 73	
		$27,298 44
Balance in the hands of the Treasurer of the Board on Dec. 31, 1892		$1,322 31

NOTE—In addition to the above amount of $1,322.31 in the hands of the Treasurer of the Board, there is still in the hands of the Territorial Treasurer the sum of $13,000 belonging to said fund, subject to the order of the Board.

RECAPITULATION OF AMOUNTS IN THE HANDS OF THE TREASURER OF THE BOARD AT THIS DATE.

College of Agriculture Fund	$ 1,322 31
Agriculture Experiment Station Fund	968 72
Total amount held by Treasurer	$ 2,291 03

REPORT OF THE TREASURER OF THE BOARD OF REGENTS OF THE UNIVERSITY OF ARIZONA.

For the fiscal year ending June 30, 1892, as required by Section 2, of the Act of Congress, showing receipts and expenditures, College of Agriculture:

1st Installment, Dec. 15, 1890	$15,000 00
2nd Installment, May 18, 1891	16,000 00
Total received to June 30, 1891	$31,000 00
Amount expended to June 30, 1891	8,000 13
Balance on hand July 1st, 1891	$22,999 87
3rd Installment, Sept. 17, 1891	17,000 00
Total available for year ended June 30, 1892	$39,999 87

Disbursements thereof for and during the year ended June 30, 1892:

Agriculture	$11,475 24
Mechanic Arts	12,892 23
Eng. Language	1,796 87
Math. Science	5,251 43
Phys. Science	1,370 31
Natural Science	2,379 93
Economic Science	1,085 40
Total expended during year	$36,251 41
Bal. unexpended July 1st, 1892	3,748 46

FOR WHAT PURPOSE EXPENDED.

Instruction	$14,080 30
Apparatus	9,643 19
Machinery	9,654 38
Text Books	1,535 30
Stock and Material	1,338 24
Total	$36,251 41

Correct: JOHN M. ORMSBY, Secretary. SELIM M. FRANKLIN, Treasurer.

REPORT OF THE TREASURER OF THE BOARD OF REGENTS OF THE UNIVERSITY OF ARIZONA.

For the fiscal year ending June 30, 1892, as required by Section 3 of the Act of Congress, showing Receipts and Expenditures, Agricultural Experiment Station.

RECEIPTS.

Government Grant	$15,000 00	
Sales of fodder	10 00	
Sale of sacks	1 50	
Refund Arid Grass Station	25 00	
Sale Laboratory stock	1 25	
Sales horse feed	146 90	
Labor, repayment	18 00	
Sale of boiler	250 00	
Repayment, A. Moss	2 00	
Balance, overdrawn	99 61	
		$15,554 26

EXPENDITURES.

Miscellaneous	$ 26 02	
Salaries	5,455 78	
Printing and Stationery	531 20	
Travelling and incidental expenses of Director and Staff	445 04	
Wagons, horses, harness, etc	396 00	
Implements	57 22	
Supplies	75 61	
Feed, Station horses and hired teams	747 38	
Labor	5,410 31	
Postage	43 20	
Repairs	211 09	
Maintenance	103 38	
Trees, plants, etc	378 16	
Library	1 50	
Apparatus	247 22	
Improvements	20 15	
Building	234 10	
Water privileges and allied expenses	1,170 90	
		$15,554 26

Correct:
J. M. ORMSBY,
Secretary.

SELIM M. FRANKLIN,
Treasurer.

NOTE.—The above statement is made for the purpose of showing that no part of the Agricultural Experiment Station grant remained unexpended at the end of the fiscal year.

Inventories.

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UNIVERSITY PROPERTY PROCURED FROM TERRITORIAL APPROPRIATIONS.

University Building	$44,000 00	
Residence Buildings	12,700 00	
Machinery Annex	3,000 00	
Forty Acres of Land at University	2,000 00	
Furniture—College and Office	2,500 00	
Total		$64,200 00

SCHOOL OF MINES.

1. Mill Machinery, comprising boiler, engine and fittings, 7 in. x 10 in. Blake crusher, pair Cornish rolls, elevator, conveyer, screens, jigs, percussion table, amalgamating machinery, motors, special apparatus and other devices and cost of foundations, timbers, spouts, drains, etc., with ore-bins, tanks, and various utensils	$12,200 00	
2. Metallurgic Laboratory, assay and balance room, including fittings, apparatus, and supplies	2,312 90	
3. Electrical apparatus, including engine, dynamo, motors, lamps, storage battery, fittings, and supplies	1,935 00	
4. Apparatus and supplies of Photographic Department	653 86	
5. Library and Periodicals	506 72	
6. Apparatus and supplies for Drawing Department	312 34	
7. Collections, etc., obtained by Director from the Territory by donation and collection	400 00	
Total		$18,320 00

SCHOOL OF AGRICULTURE.

AGRICULTURAL DEPARTMENT.

Office desks, tables, letter files and fixtures....	$ 200 00	
Library :—Books General Library.....	600 00	
Books Chemical Department.....	125 00	
Books Engineering Department....	250 00	
Books Botany & Entomology.....	125 00	
		$1,100 00

CHEMICAL DEPARTMENT.

General Laboratory Appliances.....	$ 392 05	
Special Laboratory Appliances.....	73 40	
Balances and Weights....	72 70	
Beakers.....	52 69	
Flasks.....	110 87	
Bottles.....	81 98	
Buretts, pipettes and funnels.....	71 49	
Glass tubing.....	27 80	
Special glassware.....	190 70	
Porcelain ware.....	79 20	
Special appliances for class illustration.....	56 33	
Special appliances.....	355 00	
Fillers.....	33 43	
Platinum ware.....	289 94	
Chemicals.....	249 23	
Gasoline.....	145 50	
		$2,272 31

METEOROLOGICAL APPARATUS.

6 Pocket Thermometers.....	$ 13 25	
1 Jordan's Sunshine Recorder, 1 Evaporating Tank, ...	34 40	
2 Hook Gauges.....	50 00	
16 Soil Thermometers.....	109 10	
2 Solar Vacuum Thermometers.....	18 00	
2 Solar Ter. Min, Rad. Thermometers.....	12 60	
6 Water Thermometers.....	60 00	
1 6 ft. x 4 ft. x 4 ft. evaporating tank.....	15 00	
50 feet 3 in. galvan. iron pipe.....	5 00	
1 Barograph.....	30 00	
1 Thermograph.....	30 00	

1 Actinograph	140 00	
1 Terr. Min. Rad. Thermometer	5 00	
7 Terr. Rad. Thermometers, 4 Soil Thermometers, 1 Solar Rad. Thermometer	65 90	
1 6 ft. x 4 ft. x 4 ft. evaporating tank	20 00	
		$608 25

DEPARTMENT OF IRRIGATION ENGINEERING.

1 Lallie current meter	$ 125 00	
2 100 ft. steel tapes (Hodgman)	13 50	
1 Stop watch	15 00	
1 Clinometer and level	2 67	
1 Polar planimeter	32 80	
1 Pedometer	4 75	
1 50 ft. Chesterman steel tape	5 85	
1 Locke level	11 50	
1 Gurley's Eng. transit complete	198 00.	
1 Gurley's Miner's transit	180 00	
1 18 in. Wye level with stadia wires	115 00	
1 6 in. Vernier compass	45 00	
1 N. Y. leveling rod	16 00	
1 100 ft. steel brazed chain	11 00	
4 8 ft. ranging rods	9 00	
1 Telemeter rod	12 00	
3 Sets brass pins	9 00	
1 Positive motion odometer	20 00	
1 Mannheim slide rule	3 60	
Drawing paper, tracing linen and blue paper	14 07	
Field books	3 44	
2 Scales and scale guard	4 63	
Rubber and steel triangles and curves	17 06	
1 T square, steel, 42 in	7 00	
Box drawing instruments	82 42	
India ink, pencils, rubbers and trigonometer	15 18	
Ink slabs, nests, water colors, etc	8 75	
1 3 in. German silver protractor	14 50	
1 18 in. Wye level, (Buff & Berger)	150 90	
1 Price current meter and electric attachment, 1 Pocket solar compass	309 00	
1 5 in. aneroid barometer	33 30	
1 Solar transit, Saegmiller Abb. (Buff & Berger,)	338 85	
Drawing and helios papers, 5 rolls	14 33	
1 Drawing board	35 00	
1 Box relay and key	8 85	
10 Water registers and charts, floats, etc	530 00	
1 Nilometer, property of U. S. G. S	.....	
		$2,416 95

DEPARTMENT OF BOTANY AND ENTOMOLOGY.

1	Insect cabinet	$ 50 00	
	1500 mounted insects	150 00	
	1000 mounted insects—recent collections	50 00	
1	Dozen insect cases	15 00	
1	Cage for drying insects	5 00	
2	Large force pumps, @ $9.00	18 00	
2	Small force pumps, @ $4.00	8 00	
	Insecticides and spraying appliances	9 00	
	Herbarium—mounted and unmounted specimens	340 00	
	Frames for drawings	10 00	
	Herbarium paper, etc	15 00	
12	Dissecting microscopes	100 00	
1	Analytical balance and weights	32 69	
	Test tubes, wash bottles etc	3 16	
	Reagent bottles and beakers	7 42	
	Wide mouth bottles for specimens	26 00	
1½	Gross jars for specimens	32 00	
	5000 pins for entomological work	5 15	
2	Micrometer slides	2 60	
12	Doz. corks for entomological work	11 60	
3	Pairs pruning forceps	1 05	
1	Economic microscope	42 50	
1	Binocular economic microscope	72 00	
1	Beck Universal microtome	42 50	
2	Star microscopes, without ⅛ in. objectives	35 00	
6	Star microscopes @ $22.50	135 00	
1	Ideal microscope	46 25	
3	Eye pieces @ $3.40	10 20	
1	2 in. objective	8 50	
1	⅔ in. objective	11 00	
1	1-5 in. objective	24 00	
1	⅛ in. objective oil emersion	27 00	
1	Walliston's Camera Lucida	3 75	
1	Vertical Camera Lucida	5 00	
1	Abbe stage condenser	12 50	
1	Parabolic illuminator	3 75	
1	Large bull's-eye condenser	5 25	
12	Small bull's-eye condensers	12 00	
1	Doz. dropping bottles	2 40	
	Forceps, etc	8 85	
	Sundry articles	59 07	
	Freight and Express charges	90 00	
			$ 1,548 19
	Total School of Agriculture		$ 8,145 70

AGRICULTURAL EXPERIMENT STATION.

BUILDINGS AND PERMANENT FIXTURES.

Part of University buliding, laboratory and office	$ 4,000 00	
Cottage	350 00	
Barn	200 00	
Engine house	100 00	
Well	1,000 00	
Two steam pumps and attachments	1,000 00	
Piping	500 00	
Trees and plants	800 00	
		$ 7,950 00

CHEMICAL LABORATORY.

General Laboratory appliances	207 35	
Special Laboratory appliances	60 00	
Gas machine complete	460 00	
Balances and weights	265 00	
Beakers	5 60	
Flasks	4 03	
Bottles	16 30	
Buretts, pipettes and funnels	11 92	
Glass tubing	1 78	
Special glassware	25 65	
Porcelain ware	7 05	
Filler	6 69	
Platinum ware	231 11	
Chemicals	84 20	
		$1,387 08

HORSES AND WAGONS.

1 Work team	300 00	
1 Driving team	200 00	
1 Lumber wagon	75 00	
1 Spring wagon	125 00	
1 Double harness, heavy	20 00	
1 Double harness, light	20 00	
		$740 00

TOOLS.

2 Wheelbarrows	10 00	
2 Stirring plows	20 00	
1 Subsoil plow	12 00	
1 Side-hill plow	15 00	
1 Spring tooth harrow	15 00	
1 V cultivator	15 00	
1 1-Horse cultivator	15 00	
Sundry tools and implements	51 00	
		$ 153 00

PHŒNIX.

50 acres land and water right @ $50.00	$2,500 00	
Barn $200, House $200	400 00	
Fences, irrigation fixtures, and other improvements	500 00	
		$3,400 00

PHŒNIX AND TEMPE STATIONS.

TEMPE.

Land, 20 acres	1,000 00	
Fences	100 00	
		$1,100 00

PHŒNIX.

FORAGE AND SEEDS.

16 tons alfalfa hay in stack, @ $5.00	80 00	
4 tons alfalfa hay in barn, @ $6.00	24 00	
45 sacks peas in hull	15 00	
150 lbs. sorghum seed, different varieties	4 50	
		$ 123 50

HORSES AND WAGONS.

1 Span workhorses	250 00	
1 Double harness	20 00	
1 Single buggy harness	12 00	
2 Halters	2 00	
1 Lumber wagon	75 00	
1 Single buggy	30 00	
2 Prs. doubletress and singletrees	5 00	
		$ 394 00

IMPLEMENTS AND TOOLS.

1 San Jose cultivator	$ 40 00	
1 Planet single cutivator	10 00	
3 Plows, 10-12 and 14 inch and extras	35 00	
1 Furrowing plow and extra shovels	10 00	
1 Lawn mower	10 00	
1 Iron wheelbarrow	7 00	
1 Leveller	4 00	
1 Wire stretcher and 1 cutter	2 50	
1 Sprinkling can	1 50	
1 Hotbed and 8 canvas frames	5 00	
2 Hand-saws	2 50	
2 Pairs pruning shears	4 00	
4 Weedins hoes	2 00	
7 Spades	5 00	
4 Shovels	3 00	
1 Surveyor's chain	3 00	
2 Crowbars	2 50	
1 Dozen extra clevises	2 25	
1 Brace, 12 bits	3 00	
1 Post-augur	2 00	
3 Weather buckets	2 25	
2 Well buckets and rope	2 50	
1 Windlass and rope	2 00	
1 Tub for mixing emulsion	2 00	
1 Grindstone	3 00	
Sundry tools and implements	27 25	
		$ 193 25
Total Agricultural Experiment Station		$15,441 43

RECAPITULATION OF TOTALS OF INVENTORIES.

University	$ 64,200	
College of Agriculture and School of Mines	26 465	
Agricultural Experiment Station	15 441	
Total University property		$106,106

Department of the Interior.

GENERAL LAND OFFICE,

WASHINGTON, D. C., Dec. 24, 1892.

Mr. M. P. Freeman, President of the Board of Regents, Tucson, Arizona:

SIR: In reply to your letter of November 25, 1892, you are advised that an examination of the records of this office pertaining to the Arizona University grant, shows the status of said grant to be as follows:

Selected per list filed December 27, 1882, in satisfaction thereof, 72 sections, embracing in the aggregate 45,678.68 acres.

Approved by the President January 11, 1890, 57¾ sections, embracing in the aggregate 36,890.14 acres.

Canceled January 24, 1890, by the direction of the Hon. Secretary of the Interior, at the request of the Governor of Arizona, by reason of the timber having been removed therefrom, 12 sections, embracing in the aggregate 7,668.54 acres.

In addition to the above there remain unapproved of the lands selected per list filed December, 27, 1882, by reason of the lands being unsurveyed, 1¾ section; estimated to contain 1120 acres; said land being described as follows:

S ½,	Sec. 30, T. 20 N., R. 5 E,	320 Acres
W ½,	Sec. 32, T. 20 N., R. 5 E,	320 Acres
SW ¼,	Sec. 34, T. 21 N., R. 5 E,	160 Acres
E ½,	Sec. 34, T. 20 N., R. 6 E,	320 Acres

By office letter (K) of January 24, 1890, the Register and Receiver at Prescott, Arizona, were instructed to advise the Governor of the cancellation of the selections to the extent of 12 sections, amounting to 7,668.54 acres; and that he was thereby authorized to make other selections in lieu thereof. The 1¾ section estimated to contain 1120 acres, referred to above, are shown by the township plat to be unsurveyed; hence the selection thereof was illegal, and the list will be held for cancellation to that extent.

Inasmuch as the list of selections embracing said lands was accepted by this office notwithstanding the fact that a portion thereof was unsurveyed, I am of the opinion that the State is entitled to select an equal quanity of surveyed and unappropriated public land in lieu thereof. You are therefore authorized to inform the Governor of the State that, in addition to the 12 sections which he was authorized to select by office letter (K) of January 24, 1890, in lieu of the selections canceled thereby, he will, upon the cancellation of the unsurveyed 1¾ section selected as above stated but remaining unapproved, or upon the relinquishment thereof by the State, be allowed to select from the unappropriated public land of the United States subject to entry under the general land laws, a quantity of land equal to 1¾ section, (1120 acres) in lieu of said unsurveyed lands; thus increasing the amount he is authorized to select in satifaction of the grant to 8,788.54 acres.

Very Respectfully,

M. M. ROSE,

Acting Commissioner.

College of Agricultural and the Mechanic Arts.

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An Act to apply a portion of the proceeds of the public lands to the more complete endowment and support of the colleges for the benefit of agriculture and the mechanic arts established under the provisions of an act of Congress approved July second, eighteen hundred and sixty-two.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled.

SEC. 1 That there shall be, and hereby is, annually appropriated, out of any money in the Treasury not otherwise appropriated, arising from the sales of public lands, to be paid as hereinafter provided, to each State and Territory for the more complete endowment and maintenance of colleges for the benefit of agriculture and the mechanic arts now established, or which may be hereafter established, in accordance with an act of Congress approved July second, eighteen hundred and sixty-two, the sum of fifteen thousand dollars for the year ending June thirtieth, eighteen hundred and ninety, and an annual increase of the amount of such appropriation thereafter for ten years by an additional sum of one thousand dollars over the preceding year, and the annual amount to be paid thereafter to each State and Territory shall be twenty-five thousand dollars to be applied only to instruction in agriculture, the mechanic arts, the English language and the various branches of mathematical, physical, natural and economic science, with special reference to their applications in the industries of life, and to the facilities for

such instruction: *Provided*, That no money shall be paid out under this act to any State or Territory for the support and maintenance of a college where a distinction of race or color is made in the admission of students, but the establishment and maintenance of such colleges separately for white and colored students shall be held to be a compliance with the provisions of this act if the funds received in such State or Territory be equitably divided as hereinafter set forth: *Provided*, That in any State in which there has been one college established in pursuance of the act of July second, eighteen hundred and sixty-two, and also in which an educational institution of like character has been established, or may be hereafter established, and is now aided by such State from its own revenue, for the education of colored students in agriculture and the mechanic arts, however named or styled, or whether or not it has received money heretofore under the act to which this act is an amendment, the Legislature of such State may propose and report to the Secretary of the Interior a just and equitable division of the fund to be received under this act between one college for white students and one institution for colored students established as aforesaid, which shall be divided into two parts and paid accordingly, and thereupon such institution for colored students shall be entitled to the benefits of this act and subject to its provisions, as much as it would have been if it had been included under the act of eighteen hundred and sixty-two, and the fulfillment of the foregoing provisions shall be taken as a compliance with the provision in reference to separate colleges for white and colored students.

SEC. 2. That the sums hereby appropriated to the States and Territories for the further endowment and support of colleges shall be annually paid on or before the thirty-first day of July of each year, by the Secretary of the Treasury, upon the warrant of the Secretary of the Interior, out of the Treasury of the United States, to the State or Territorial Treasurer, or to such officer as shall be designated by the laws of such State or Territory to receive the same, who shall, upon the order of the trustees of the college, or the institution for colored students, immediately pay over said sums to the treasurers of the respective colleges or other institutions entitled to receive the same, and such treasurers shall be required to report to the Secretary of Agriculture and to the Secretary of the Interior, on or before the first day of September of each year, a detailed statement of the amount so received and of its disbursement. The grants of moneys authorized by

this act are made subject to the legislative assent of the several States and Territories to the purpose of said grants: *Provided*, That payments of such installments of the appropriation herein made as shall become due to any State before the adjournment of the regular session of Legislature meeting next after the passage of this act shall be made upon the assent of the Governor thereof, duly certified to the Secretary of the Treasury.

SEC. 3. That if any portion of the moneys received by the designated officer of the State or Territory for the further and more complete endowment, support and maintenance of colleges, or of institutions for colored students, as provided in this act, shall, by any action or contingency, be diminished or lost, or be misapplied, it shall be replaced by the State or Territory to which it belongs, and until so replaced no subsequent appropriation shall be apportioned or paid to such State or Territory; and no portion of said moneys shall be applied, directly or indirectly, under any pretense whatever, to the purchase, erection, preservation, or repair of any building or buildings. An annual report by the president of each of said colleges shall be made to the Secretary of Agriculture, as well as to the Secretary of the Interior, regarding the condition and progress of each college, including statistical information in relation to its receipts and expenditures, its library, the number of its students and professors, and also as to any improvements and experiments made under the direction of any experiment stations attached to said colleges, with their costs and results, and such other industrial and economical statistics as may be regarded as useful, one copy of which shall be transmitted by mail free to all other colleges further endowed under this act.

SEC. 4. That on or before the first day of July in each year, after the passage of this act, the Secretary of the Interior shall ascertain and certify to the Secretary of the Treasury as to each State and Territory whether it is entitled to receive its share of the annual appropriation for colleges, or of institutions for colored students, under this act, and the amount which thereupon each is entitled, respectively, to receive. If the Secretary of the Interior shall withhold a certificate from any State or Territory of its appropriation the facts and reasons therefor shall be reported to the President, and the amount involved shall be kept separate in the Treasury until the close of the next Congress, in order that the State or Territory may, if it should so desire,

appeal to Congress from the determination of the Secretary of the Interior. If the next Congress shall not direct such sum to be paid it shall be covered into the Treasury. And the Secretary of the Interior is hereby charged with the proper administration of this law.

SEC. 5. That the Secretary of the Interior shall annually report to Congress the disbursements which have been made in all the States and Territories, and also whether the appropriation of any State or Teritory has been withheld, and if so, the reasons therefor.

SEC. 6. Congress may at any time amend, suspend, or repeal any or all of the provisions of this act.

Approved August 30, 1890.