ANNUAL REPORT

OF THE

President of the Board of Regents

OF THE

STATE AGRICULTURAL COLLEGE

TO THE

GOVERNOR OF OREGON

FOR THE YEAR ENDING JUNE 30, 1890.

LEGISLATIVE ASSEMBLY, SIXTEENTH REGULAR SESSION.

1891.

PUBLISHED BY AUTHORITY.

SALEM, OREGON:
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REPORT.

To His Excellency Sylvester Pennoyer, Governor of Oregon:

SIR: I have the honor of forwarding to you the following report from the president of the board of regents of the State agricultural college of Oregon.

Very respectfully,

WALLIS NASH,
Secretary.

CORVALLIS, December 31, 1890.

THE STATE AGRICULTURAL COLLEGE.

To His Excellency Sylvester Pennoyer, Governor of Oregon:

SIR: The State agricultural college of Oregon recognizes three great objects:

First—Education of young men and women in the several subjects ordered by the act of congress of 1862, namely, agriculture and the mechanic arts, not forgetting the other usual branches of a liberal education.

Second—The carrying out of the intentions of congress in establishing the experiment station, as a department of the college, and by means of the special appropriation of $15,000 annually, under the Hatch act, approved March 2, 1887.

Third—The extension of knowledge of improved methods of agriculture and its allied sciences, and of horticulture and its various branches, among all persons interested by means of bulletins, published quarterly from the experiment station, and by farmers' institutes held under the auspices and direction of the college in various sections of the State.

This report falls naturally, therefore, under these three heads. Dealing then, first, with the State agricultural college as a teaching institution in agriculture and the mechanic arts, and the usual branches of a liberal education, I must preface my description of the college as it is to-day with a short sketch of its history.

The board of regents appointed during the February session of the legislature of 1885 did not assume the control and government of the college until July 2, 1888, when the new building erected by the citizens of Benton county was formally accepted by you, sir, as Governor of Oregon. Therefore, only two years, from July, 1888, to June 30, 1890, cover the whole history of the college under State control—a short time, measured by months and weeks, but perhaps long enough to enable judgment to be passed on the plans formed by the State board of regents and the measures taken by them to carry such plans into effect.

The task assumed by the State board was no light one.

The Methodist Episcopal Church South had, first, assumed by official acts recognized by the legislature of Oregon and adopted by the act of February, 1885, to relinquish to the State the control and management of the agricultural college, and had then, by means of a suit in equity against the individual members of the State board of regents, tried to nullify their acts and resume control.

All parties, save and except the representatives of the Methodist Episcopal Church South, accepted in good faith the acts of the legislature of Oregon, approved as above mentioned February 11, 1885, and confirmed by a second act approved November 21, 1885. The citizens of Benton county, aided by a few outside friends, proceeded to complete the subscription and payment of sums aggregating about $25,000, and the sums so raised were expended by the building association, with the advice and approbation of the State board of education, as provided in the act of February, 1885, in the erection and equipment of the new college building on the farm designated by the legislative act as the college farm, near Corvallis.

In this new building—most admirably adapted to accommodate for teaching purposes upwards of 150 students—the agricultural college of Oregon, at last controlled and governed by the State of Oregon, through the board appointed by the State, opened its session on September 12, 1888, with an attendance of about 40 students; closing that year, however, with 91 on the rolls.

Much preparatory work had been accomplished by the board of regents, who had met at regular intervals from the time of their first appointment. The scheme of studies had been framed by a special committee of the board, of which Hon. Geo. W. McBride, Secretary of State, and Hon. E. B. McElroy, Superintendent of Public Instruction, were the most active members, and was only adopted after a most careful scrutiny and long consideration by the full board. Prior to this plans and methods of nearly all the agricultural colleges in the United States had been thoroughly analyzed and compared, and the course of study and management of the Oregon college is based on the results so laboriously obtained. The aim sought to be attained was thorough technical education in "Agriculture and the Mechanic Arts," as laid down in the original act of congress. To make this plan effective a first-rate staff of teachers was necessary, imbued with a united and harmonious spirit of interest in their work for the work's sake, and a determination that the agricultural college of Oregon should be second to none in the quality of the teaching and the educational influence on the youth of Oregon there taught.

No appointments have been made without long and careful inquiry into the character and attainments of the applicants. Such

appointments are, by necessity of the case, experiments, and it cannot be wondered at that in a staff of a dozen men the board have considered it to be for the best interests of the institution as a whole that certain changes of men and modifications in subjects taught should be made in the course of the first two years of the new college? Another requisite for the usefulness of the school was that the charges must be low enough to enable the farmers' and mechanics' sons and daughters to attend without too heavy a drain on the parental purse, or better still, the cost must be set at a figure not too high to be covered by the savings of that most worthy class of students who prize the college opportunities enough to earn and lay by hardly-earned money to get there. For this end the students must be lodged and boarded by the college, advantage being also taken of the produce of the farm, garden, and orchard of the college to reduce the cost of living to the lowest point. But there were no buildings suitable for these purposes. The liberality of the legislature of Oregon was appealed to, and at the session of 1889 they responded by including in the appropriation in favor of the State agricultural college then passed an amount which served, with the strictest economy, to build and furnish a student's hall for the reception of about 55. Very few then thought that by the end of 1890 accommodations for 150 students would have to be provided. But to make the teaching of agriculture and horticulture effective on a working scale, and at the same time to provide suitable scope for the experimental work called for by the Hatch experiment station act, much more farming land was necessary than was furnished by the 35-acre farm referred to in the act of 1885, and which farm had been purchased by public subscription of the citizens of Benton county tor the benefit and purposes of the State agricultural college many years ago.

For this purpose also the legislature of 1889 was urged to make an appropriation. They met these requirements also by providing the funds by which about 155 acres of farming land, in proximity to the 35-acre farm and the college buildings, were purchased for $14,215.40 in the summer of 1889, and a handsome octagonal barn was built on the newly-purchased farm and fitted up with feeding stalls, silo, root house and storage room for hay and grain. These provisions also have now proved inadequate for the increased production of the farm. Technical teachings in the mechanic arts demands a building for carrying on working in wood and metal, some machines, of such simple kinds as are in common use, and a good supply of carpenters' and smiths' tools and implements. Funds for these purposes were also found out of the $30,000 appropriated by by the legislature of 1889; a convenient two-storied workshop, with

draughting room and recitation room attached, was built of brick and partially supplied with machinery and tools—sufficient, at any rate, for the instruction in wood-working of a considerable number of students. The expenditure under this head has been about $7,441. The Oregon State agricultural college receives both male and female students. The scheme of instruction adopted by the board included, for the special benefit of female students, classes in household economy and hygiene. If the boys were to be practically taught how to lay out, manage and work a farm, garden, or orchard, the girls must be taught the household duties of the higher social life. To cook, to make and repair the family garments, to care for the preservation of individual and of family health, to tend the sick, to study how to beautify and adorn the home—all these duties lie within this most useful department. Even after the resolutions to establish this chair in the college had been taken it was a long while before the regents could satisfy themselves as to making the appointment. Finally Miss Margaret C. Snell, M. D., of Boston, lately of the Snell academy, Oakland, was appointed, and the board have since seen reason to congratulate themselves, and above all, the lady students of the college, on the selection so made. A visit to the class-room, filled with class after class of girls at work from early morning until the college day closes, will amply repay any one interested in the higher technical education of women today.

Facilities have also been provided for the practical study of horticulture, the importance of which, especially to Western and Southern Oregon, the board can hardly overrate. A forcing house 25 feet by 16 was first built, with potting shed and work room attached, and last year a green-house 39 feet by 20 was added. Illustration of the work done in these houses was given in the exhibit of ornamental plants and flowers, which drew so much admiration at the State fair at Salem. All the florists' work of propagating, budding, layering, potting and forcing of flowers and ornamental plants is practically taught to the students of both sexes, under a highly-qualified gardener, who is now the horticulturist to college and station. Special attention is given to the successful growing of fruits large and small, and of vegetables. The old college farm provided one orchard of neglected fruit trees, which in the state in which it came under the care of the board, presented an extreme example of what an orchard ought not to be, but afforded an admirable opportunity for practicing methods of extermination of codlin moths and all other Oregon enemies of the orchardist. The farm afterwards bought with State money had on it also a large old orchard in poor condition. These orchards have been properly cared for, except as to such of the trees as were left to show visibly

the result of neglect, or were in the hands of the professor of entomology for his use in showing the methods and results of insecticides, and of apparatus of all sorts used in the warfare against injurious and destructive insects. Another orchard of about 10 acres is about to be planted out in the neighborhood of the new barn the coming fall and winter. All the work of the fruit grower in grafting, layering, budding, in arching and propagating fruit trees, is thoroughly and practically taught in the revised course of study now in operation. The importance to the student of thorough botanical knowledge is recognized by the board, and a professor of botany now devotes all his time and attention to the teaching of botany in the college, and the botanical researches included in the station work. Attention was called in the report for 1889 of the president of the college to the pressing need of an entomologist. The board of regents were fully alive to this, but the funds at their disposal did not admit of the organization of this branch of work and the appointment of a professor until the beginning of the session of 1889-90. The appointment then made of Professor F. L. Washburn, B. A., (Harvard) has proved highly successful, and the work of this department is continually growing in interest and importance.

The act of congress under which the college was established recognized, as above stated, that the teaching of agriculture and the mechanic arts should not exclude proper teaching in the English language and literature and other branches of a liberal education. While the practical, technical matters, to which reference has already been made, are given as the primary objects in the course of studies at this college, yet thorough training in English grammar and literature, and in mathematics and its allied sciences, is insisted on. One of the features which distinguishes the course here from that at any other college or university in the State is, that one hour's practical labor is made compulsory daily on every male student. The nature of this labor varies with the season of the year, with the stage of the college course of any one student, and with the nature of the college course itself, whether agricultural, mechanical, or scientific. Besides this one hour of compulsory labor, a certain amount of money is allowed for student labor in the agricultural and horticultural departments, to be distributed among such students as earn it by voluntary labor, at the rate of 15 cents per hour. The time tables, to be found on page — of this report, will show the number of hours of class-room college work done by each professor in the college years 1889 and 1890; and the same tables will indicate, also, the time left for the station work of those professors who are members of the experiment station force.

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The chairman of the executive committee was enabled to report to the board in March, 1885, that 104 students were in attendance —a gratifying increase on the forty-three of September, 1888. At this time upwards of 185 students are on the rolls, and an attendance of 200 is fully expected after the reöpening of the college from the Christmas vacation.

It is pleasant to note two changes in the composition of the classes: First, the area from which the students come is growing wider all the time, and the students at this time, as a whole, are older, more mature, and have been better taught previous to their entrance in the college.

In a list of agricultural colleges of the United States for 1889 (kindly furnished by the courtesy of Hon. A. W. Harris, acting director of experiment stations, Washington, D. C.,) Oregon stood sixth from the foot of the list in number of students. If Oregon had been represented in that list by her present number of students her place would have been thirteenth from the foot—a considerable change inside of two years. It is believed that the agricultural college of Oregon has at this time more students in proportion to the population of the State than any strictly agricultural college in the Union.

A comparison between the number of teachers and the students in the several classes in the Oregon college, with similar figures gathered from the catalogues of a number of the leading colleges, places Oregon in the front in this respect.

The attendance of students is not likely to fall off now that the opportunities for usefulness are increased by the passage of the new Morrill act, approved August 30, 1890. This act places $15,000 at the disposal of the regents for the year ending July, 1890, and a sum of $16,000 for the current year 1890–91, with annual increases of $1,000 until the limit of $25,000 is reached. The first $15,000 will be chiefly devoted to increasing and improving the equipment of the college, subsequent appropriations to the current annual expenses. This course has been suggested by the association of American colleges and is being generally followed.

But as the present attendance of students has outgrown the present buildings, both for teaching, experimental and lodging purposes, the regents are at a loss to know how any increased numbers can be accommodated. Congress only attaches one condition to its munificent grant, which is that no part of it shall be spent on buildings—such expense the several States must bear.

Therefore the legislature of Oregon must be appealed to, however reluctant the board of regents, and you, sir, as Governor, may be to appear before our law-makers to urge them to again give monies to

this college which they generously favored in 1889. But there is no alternative. The pressing needs of this institution are $10,000 to build an experiment station laboratory. In this new building the chemical, botanical, agricultural, horticultural and zoölogical and entomological laboratories must be placed, in order to give the college building the rooms at present occupied for these purposes; and also to give the station workers the benefit of the larger space and greater conveniences imperatively needed. And there must be a building constructed to accommodate not less than 150 male students. This will absorb not less than $15,000. And the board are also most anxious to build and to begin at once to operate the dairy, which was proposed in 1889, but the erection of which had to be left over for want of funds.

The board of regents used every effort to economize in the outlay of the $30,000 appropriated in 1889. They reduced the size of the buildings below what they desired to put up; they let the erection of the students' hall, mechanical hall and barn to the lowest responsible bidders; they engage to follow the same course respecting the outlay of all further funds with which they are entrusted, but the welfare of the State demands certain expenditures now in order that this growing and most useful institution may fulfill its beneficent purpose.

And, after all, it is not an unreasonable request, growing, as it does, from the successful working and development of the trust committed to the regents by the State in 1885. The usefulness to the people of Oregon of what has already been done is, surely, the best of all claims to be entrusted with still larger responsibilities. The figures of the expenditure, both of the appropriations and on current account for the college, are shown on the treasurer's account appended.

As to the experiment station, the report regarding its operation and its financial condition is a separate document, to which attention is respectfully called.

It remains to notice that the series of farmers' institutes organized by the board in many parts of the State during the past two years, and carried out by the institute's committee under the board's direction, have all proved attractive in a growing degree, and it is believed have been found of great benefit to the farming community.

Commencing with Corvallis, the series of 1889-90 comprised meetings at Ashland, Albany, Oregon City, Eugene City, Pendleton and Independence, and the series of 1890-91 at Grant's Pass, Union, McMinnville, The Dalles and Junction City—one at Silverton remains to be held. In all cases there was a cordial invitation to come again, and a promise in that event of still larger attendance and greater efforts to make the meetings interesting.

APPENDIX I.

The following is a statement of the average amount of work done by each professor during the session 1889-90, estimated in hours or lessons of fifty minutes each.

Name of Professor.	Chair.	No. of hours a week spent in class work
B. L. Arnold, A. M	President and English	25
E. Grimm, B. S	Agriculture	10
J. D. Letcher, C. E	Mathematics	25
F. Berchtold, A. M	Languages	27½
W. N. Hull, A. M	Elocution and drawing	10½
E. R. Lake, M. S	Botany and horticulture	7
P. H. Irish, Ph. D., and assistant	Chemistry	6
W. W. Bristow, A. B	Preparatory department	25
F. L. Washburn, A. M	Zoölogy and entomology	7
G. A. Covell, M. S	Mechanical engineering	25
Margaret P. Snell, M. D	Household economy and hygiene	25
W. A. Lampkin, B. S	Assistant to Prof. Bristow	10

June 18, 1890.

Very respectfully,

B. L. ARNOLD.

APPENDIX II.

GENERAL CONDITION.

Tabulated statement of students in departments, etc.

Total number	152
Number of male students	105
Number of female students	47

CLASSIFIED BY DEPARTMENTS.

College	81
Preparatory	71
Total	152

CLASSIFIED BY YEARS.

First year	55
Second year	14
Third year	6
Fourth year	0
Post-graduates	6
Total	61

CLASSIFIED BY COURSES.

Agricultural	24
Scientific	17
Mechanical	12
Domestic economy	18
Literary	4
Post-graduate	6
Total	81

CLASSIFIED BY STATES.

Oregon	129
Washington	2
Montana	1
Total	132

CLASSIFIED BY COUNTIES.

Baker	2
Benton	88
Clackamas	7
Columbia	6
Douglas	1
Jackson	1
Klamath	1
Lane	4
Linn	4
Marion	5
Polk	10
Union	5
Umatilla	1
Wasco	3
Yamhill	5
Total	143

CLASSIFIED BY APPOINTMENTS.

Benton	5
Baker	2
Columbia	3
Clackamas	4
Douglas	1
Jackson	1
Klamath	1
Lane	4
Lake	1
Linn	2
Marion	7
Polk	7
Union	4
Umatilla	1
Wasco	2
Yamhill	5
Total	50

TREASURER'S REPORT.

CORVALLIS, Or., June 24, 1890.

To the Board of Regents of the State Agricultural College:

GENTLEMEN:—I beg leave to submit the following statement as treasurer of the State agricultural college of receipts by me during the past year, both on college income account, the Hatch experiment station fund and the purchase or capital appropriations made by the legislature of Oregon.

The accompanying distributive statements of disbursements have been made out in a shape to secure an easy comparison with the outlay of the previous year. These documents taken together will constitute my treasurer's report for the year now closing.

All books, papers and documents are herewith submitted for examination.

I desire to state that Mr. H. R. Clark, your clerk, has experienced much difficulty during the past year in making up and segregating the various amounts and accounts. He is now familiar with the system we use, and will be able during the coming year to present monthly statements of receipts and outgoings. I have found him diligent and attentive.

Very respectfully,

(Signed) T. E. CAUTHORN,
Treasurer.

EXPENDITURES ON IMPROVEMENT FUND

Under legislative appropriation of $30,000 under act approved February 18, 1889.

Purchase of land		$14,215 40
Mechanical hall	$5,829 92	
Tools and machinery	1,611 95—	7,441 87
Engine and boiler		934 87
Well, water tank, pump and pipe		1,520 26
Students hall and dormitory		5,301 20
Furnishing the same		1,277 40
Barn	1,843 50	
Woodshed	470 00	
Cow barn and sheds	175 00	
Boiler house	128 00	
Work in barn, silo, granary, fixing scales, etc	176 30—	$ 2,792 80
		$33,483 80
Credit by appropriation		30,000 00
Balance due Treasurer		$ 3,483 80

Distribution.		Total figures for 1889-1890.	Amount appropriated for 1889-1890.	Actual expenditures July, 11, '89, June, 24, '90.
College advertising and printing 1889-90	$306 26	$ 487 44	$ 500 00	$ 822 26
Station B, 1889-90	516 00			
Care of grounds	$ 511 95	1,504 81	400 00	
Labor transferred from station account	1,171 46	1,182 52		1,779 23
Station labor, care of grounds	95 28			
Current expense, fuel, etc		451 03		657 61
Furniture and outfit	1-5 of $1,993 16 $398 63			456 91
	1-5 of 291 41 58 28			
Freight, expressage and drayage		182 61	200 00	158 77
Insurance		150 00	200 00	360 66
Postage, stationery and telegrams		78 43	75 00	84 61
Repairs and betterments		498 29	500 00	828 33
Traveling expenses		427 75	800 00	619 31
Live stock		282 00	600 00	595 00
Salaries (see list of annual amount)		12,059 05	14,050 00	
Paid to June 24, balance from 1888-89	$2,064 40			11,241 22
Paid on account 1889-90	9,176 82			
Balance due June 24, 1890, and since paid	6,053 18			
Household economy				374 23
Library				7 05
Miscellaneous		207 37	557 00	322 85
Sanitary expenses				241 90
Outfit of professors' rooms				327 44
Mechanical		127 70		
Balance from 1888-89			269 48	269 48
		$ 19,632 16	$ 18,550 11	$ 19,146 86
Deduct balance of salary account 1889-90, paid 1889-90				2,064 40
				$ 17,082 46
Add bal. of salaries 1889-90, due July 1, 1890, subsequently paid				6,053 18
				$ 23,135 64
Total receipts as per attached list				19,835 83
Balance due treasurer				$ *3,299 81

*Of this bolance due treasurer of $3,299 81, $1,500 is represented by the receipt of $9,000 only from the State Treasurer on agricultural college fund interest account, instead of $10,500 estimated receipts.

RECEIPTS BETWEEN JULY 1, 1889, AND JUNE 24, 1890.

Date.	From what source.	College income account.	Station account.
1889			
Oct. 7	Interest	$ 1,000 00	
7	Appropriation	1,666 67	
11	Tuition	705 00	
21	Uniforms	58 10	
21	Expenses (traveling) returned	24 70	
23	Uniform	5 40	
Dec. 6	Appropriation	833 33	
1890			
Jan. 4	Interest fund	2,500 00	
4	Tuition	175 00	
Feb. 15	Sale of team	225 00	
Mar. 10	Sale of vegetables	10 20	
10	Appropriation	1,666 67	
10	Appropriation	833 34	
10	Interest fund	2,500 00	
Apr. 15	Tuition	80 00	
18	Repayment from station fund	1,632 52	
May 14	Credit on over payment	8 90	
June 21	Sale of pipe and pot	10 00	
20	Tuition	200 00	
14	Overpaid J. C. Applewhite	36 00	
		$ 15,170 83	
	Due June 24, and since paid—		
26	Tuition $ 165 00		
July 2	Appropriation 1,666 67	$ 4,665 00	
2	Appropriation 833 33		
	Interest 2,000 00		
		$ 19,835 83	
	From U. S. government		$ 15,000 00

SALARY LIST 1889–1890.

COLLEGE.

President B. L. Arnold, A. M	$ 1,600 00
J. D. Letcher, C. E., Professor of Mathematics and Engineering, and of Military Science and Tactics	1,600 00
E. Grimm, B. S., Professor of Agriculture	500 00
E. R. Lake, M. S., Professor of Botany and Horticulture	600 00
P. Herbert Irish, Ph. D., Professor of Chemistry	600 00
G. A. Covell, M. S., Professor of Mechanics and Mechanical Engineering	1,600 00
F. L. Washburn, B. A., Professor of Zoölogy and Entomology	600 00
Margaret Snell, M. D., Professor of Household Economy and Hygiene	1,000 00
F. Berchtold, A. M., Professor of Modern Languages	1,600 00
W. N. Hull, A. M., Professor of Common Law, Physiology and Mechanical Drawing	1,600 00
W. W. Bristow, A. B., Principal Preparatory Department and Professor of Book-keeping	1,600 00
George Coote, Foreman in Horticulture	450 00
Robert Irwin, Janitor	480 00
H. R. Clark, Clerk and Steward	400 00
T. E. Cauthorn, Treasurer	500 00
Wallis Nash, Secretary	500 00
	$15,230 00

EXPERIMENT STATION.

E. Grimm, Agriculturist and Director	$ 1,500 00
E. R. Lake, Botanist and Horticulturist	1,000 00
P. H. Irish, Chemist	1,000 00
F. L. Washburn, Entomologist	600 00
H. T. French, Superintendent of Farm	900 00
George Coote, Foreman in Horticulture	450 00
H. R. Clark, Clerk	600 00
Robert Irwin, Janitor	300 00
President B. L. Arnold, President of Council	400 00
W. D. Bigelow, Assistant Chemist	1,000 00
	$ 7,750 00

ACCOUNTANT'S REPORT OF FEES COLLECTED.

To the Board of Regents of the State Agricultural College of Oregon:

GENTLEMEN:—Following is the report of my work as accountant for the session 1889–90:

Amount of tuition fee, term I	$322 50
Amount of tuition fee, term II	355 00
Amount of tuition fee, term III	217 50
Total amount for session	$895 00

Very respectfully,
(Signed) F. BERCHTOLD.

REPORT OF SPECIAL COMMITTEE OF BOARD OF REGENTS ON TREASURER'S ACCOUNTS.

CORVALLIS, Oregon, June 25, 1890.

MR. PRESIDENT:—Your committee, to whom was referred the annual report of Hon. T. E. Cauthorn, treasurer of the board, beg leave to submit that we have examined the said report and accompanying books, and find that the books are neatly and properly kept, and that the accounts of the treasurer, as shown by this report, are correct.

(Signed) W. P. KEADY,
(Signed) J. T. APPERSON,
(Signed) A. R. SHIPLEY.

OREGON EXPERIMENT STATION.

REPORT.

CORVALLIS, Or., December 31, 1890.

To His Excellency Sylvester Pennoyer, Governor of Oregon:

SIR: In accordance with section 5 of the act of congress, usually called "The Hatch Experiment Station Act," we have the honor of submitting to you a report of the operations of the Oregon experiment station for the year commencing July 1, 1889, and also a report of the receipts and expenditures on station account during the financial year expiring June 30, 1890.

Very respectfully,

WALLIS NASH,
Secretary of the Board of Regents.

AGRICULTURAL EXPERIMENT STATION FUND.

Report of special committee of the board of regents at the annual board meeting, held at Corvallis, Oregon, on June 25, 1890.

To His Excellency Sylvester Pennoyer, Governor of Oregon:

SIR: We, the special committee of the board of regents of the State agricultural college, to whom was referred the duty of examining and reporting on the account of the treasurer of the State agricultural college, who is also treasurer of the Hatch experiment station, beg to report as follows:

We have considered the summary of expenditures and receipts furnished us by the treasurer, Hon. T. E. Cauthorn, a copy of which is hereto attached, and we have examined the treasurer's books and the vouchers submitted by him.

We find the books well kept and correspond with the vouchers produced, and we report that the summary so attached hereto cor-

rectly shows the receipts and payments of the said treasurer of and relating to the Hatch experiment station fund, between the 1st day of July, 1889, and this 25th day of June, 1890.

Very respectfully,

(Signed) W. P. KEADY,
(Signed) J. T. APPERSON,
(Signed) A. R. SHIPLEY.

CORVALLIS, Or., June 25, 1890.

I hereby certify that the following is a true copy of the summary of receipts and payments referred to in the above report.

(Signed) T. E. CAUTHORN,
Treasurer.

I hereby certify that the above signature is that of the treasurer of the State agricultural college of Oregon.

(Signed) WALLIS NASH,
Secretary.

DISTRIBUTION OF EXPENDITURES, 1889–90.

Distribution.	July 1, 1889, to June 15, 1890, 11½ months.	Expenditure in last 15 days in June, estimated or actual.	Total one year.
Chemical apparatus and supplies	$ 814 12	$ 42 15	$ 856 27
Freights, expressage and drayage	245 23		245 23
Fencing and drains	321 36	11 57	332 93
Greenhouse and potting shed	650 00		650 00
General fittings	241 18		241 18
Incidental expenses	438 86		438 86
Library	613 65		613 65
Labor	2,096 42		2,096 42
Postage, stationery and telegrams	87 70		87 70
Printing and advertising	146 85		146 85
Salaries	4,792 50	2,640 74	7,433 24
Supplies	865 60		865 60
Scientific instruments	300 20	3 00	303 20
Tools and machinery	431 71	257 16	688 87
Total	$ 12,045 38	$ 2,954 62	$ 15,000 00

NOTE.—The extra labor in this department, amounting to $1,013.02, has been transferred to college account.

STATEMENT OF DISBURSEMENTS, JULY 1, 1889, TO JUNE 30, 1890.

For what.		Even and one-half months.	Fifteen days, estimated and ascertained.	Total.
AGRICULTURE—				
Books		$ 237 45		$ 237 45
Fencing and drainage		321 36	$ 11 57	332 93
Instruments, etc		13 50		13 50
Seeds and plants		182 26		182 26
Tools and machinery		185 31	98 35	283 66
Labor		1,957 75	403 21	2,360 96
Food for stock		268 79	93 84	362 63
Miscellaneous		199 31	26 22	225 53
Salaries—				
Agriculturist and director	$1,500 00			
Superintendent of farm	900 00	1,725 00	600 00	2,325 00
		$5,090 73	$1,233 19	$ 6,323 92
Deduction by transfer of excess labor to college account				1,013 02
				$ 5,310 90
HORTICULTURE AND BOTANY—				
Greenhouse		$ 650 00		$ 650 00
Seeds and plants		120 88		120 88
Books (but including part payment for team)		376 20		376 20
Tools and machinery		246 40		246 40
Scientific instruments		167 32		167 32
Miscellaneous (but including part payment for team)		336 97	$ 10 85	347 82
Labor		658 48	90 00	748 48
Salaries—				
Botanist	$1,000 00			
Foreman	450 00	1,342 50	107 50	1,450 00
		$3,898 75	$ 208 35	$ 4,107 10
CHEMISTRY—				
Laboratory and fittings		$ 255 63	15 00	270 63
Apparatus and supplies		814 12	42 15	856 27
Miscellaneous		196 87	13 80	210 67
Salaries—				
Chemist, per annum	$1,000 00			
Assistant, per annum	1,000 00	1,375 00	500 00	1,875 00
		$2,641 62	$ 570 95	$ 3,212 57
ZOÖLOGY AND ENTOMOLOGY—				
Scientific instruments		$ 119 38		$ 119 38
Fitting rooms, apparatus, etc		407 45	$ 21 86	429 31
Salaries—				
Entomologist	$ 600 00	350 00	150 00	500 00
		$ 876 83	$ 171 86	$ 1,048 69

STATE AGRICULTURAL COLLEGE OF OREGON.

BOARD OF REGENTS.

W. S. Ladd, president, Portland.
T. E. Cauthorn, treasurer and chairman executive committee, Corvallis.
Wallis Nash, secretary, Corvallis.
Governor Sylvester Pennoyer, Salem (*ex-officio*).
Secretary of State Geo. W. McBride, Salem (*ex-officio.*)
Superintendent of Public Instruction E. B. McElroy, Salem (*ex-officio*).
Master of State Grange H. E. Hayes, Oswego.
J. T. Apperson, Oregon City.
John Emmett, Umpqua Ferry.
J. W. Grim, Aurora.
W. P. Keady, Portland.
A. R. Shipley, Oswego.
J. K. Weatherford, Albany.

REGULATIONS

Governing that Department of the State Agricultural College of Oregon which is known as the Oregon Agricultural Experiment Station.

Adopted by the Board June 25, 1889.

1. The board of regents has executive control of the station, is responsible for its expenditures; apportions the income among the several departments of the station; elects the members of the working force; orders and directs, in general terms, the nature of the scientific work to be undertaken by the working force, in its various departments, and assumes, from time to time, such other duties as may appear to the board to be involved in, or arise from, any of the foregoing items, including the establishment of branch stations in various parts of the State.

2. A station council is hereby created, consisting at first of the president of the college, the director of the station, and the agriculturist, botanist and chemist of the station force. Changes or additions may be made by the board of regents from time to time as fresh departments are added to the station force, or reärrangements effected therein.

The president of the college is *ex-officio* the president of the station council, with the powers and functions in carrying on the

business of the council usually attached to the office of president. He is the official representative of the station council in its relations with the board of regents.

THE FUNCTIONS AND DUTIES OF THE COUNCIL

Are—*a*. To prepare plans of scientific work and to submit same to the board of regents, with financial estimates for carrying the same out.

b. When such plans shall have been approved by the board of regents, to apportion the same among the members of the working force, and submit to the board periodical reports of the progress of the same.

c. To prepare and submit to the board quarterly the drafts of the bulletins which are by law demanded from the experiment station, and when the same have been printed, to see to the due publication of the same.

d. To promote in all practicable ways farmers' institutes in various parts of the State of Oregon, held under the direction of the State agricultural college.

3. The director of the station shall maintain a general and daily oversight of the various departments, and report the condition of the work to the station council.

He shall examine and certify all requisitions for purchase demanded, and all vouchers for payments needing to be made by the departments. He shall cause to be kept, and shall be responsible for the accuracy of all station labor accounts. He shall have charge of the station correspondence, except in cases where the council may apportion such correspondence among other members.

4. Each member of the station force shall be independent in, and responsible for, the work of his own department, receiving and carrying out the general instructions from the station council, and furnishing such periodical reports of the progress of work as he may from time to time be requested to supply. When supplies or outfit are needed, the particulars shall be shown on a written requisition, signed by the head of the department, and by him handed to the director. All accounts or invoices for such supplies or outfit shall be procured by the head of the department in question, and, if correct, shall be so certified by him and handed to the director.

WALLIS NASH,
Secretary.

CORVALLIS, June 25, 1889.

FOR THE YEAR ENDING JUNE 30, 1890.

STATION FORCE.

B. L. Arnold, A. M., ex-officio President.
E. Grimm, B. S., Director and Agriculturist.
E. R. Lake, M. S., Botanist and Horticulturist.
P. Herbert Irish, Ph. D., Chemist.
F. L. Washburn, A. B., Entomologist.
W. D. Bigelow, M. S., Assistant Chemist.
H. T. French, M. S., Superintendent of Farm.
George Cook, Foreman in Horticulture.

REPORT OF THE OPERATIONS OF THE AGRICULTURAL EXPERIMENT STATION IN CONNECTION WITH THE STATE AGRICULTURAL COLLEGE OF OREGON DURING THE YEAR ENDING JUNE 30, 1890.

During the year now under review considerable progress has been made in several lines of experimental work, the general outlines of which were referred to in the report of the previous year. Popular attention has been drawn to one important feature of these experiments by the exhibition at the State fair in Salem in September, 1890, and at the Mechanics' fair in Portland in October, 1890, of a collection of 425 distinct varieties of potatoes grown on the college farm under generally similar conditions of land and culture.

The comparative results of these experiments, carefully tabulated, will appear in a forthcoming bulletin; and thus one great advantage of the Oregon experiment station to the farmers of the State will have been fully secured and demonstrated. The first results on 79 varieties of potatoes so treated and grown appeared in station bulletin No. 4 of January, 1890, to which attention is afresh directed.

The tests of grasses and clovers on the college farm, which were begun as the first experimental work undertaken when the station was established, have been carried further during the past year, and 125 plats have been set out for purposes of test and comparison. The product of each plat was weighed in the green state and as hay, and these results will soon be published in station bulletins. The almost uniform success in growing these grasses and clovers on soil which is in general terms white land, and was in poor condition, seems to demonstrate, if proof were needed, that the Willamette valley is especially adapted to these systems of mixed farming in which the clovers and tame grasses take a large and profitable part. Similar comparative experiments on 90 varieties of wheat, 16 of

oats and 37 of corn have been made. Specimens of many of the products were exhibited at Salem and Portland and excited much attention. Many other products of the farm, such as sugar beets, mangel wurzel, carrots, beans, vetches, etc., have also been or are in process of being grown and tested.

There are now on the college farm good examples of four breeds of cattle—Jerseys, Polled Angus, Durham, and Hereford—of which two Jerseys, a herd-book bull and cow, were kindly donated by Hon. J. T. Apperson, of Oregon City; a Polled Angus cow by Mr. T. Smith, of Corvallis; a Durham bull calf by Mr. P. K. Waters, of Eugene, and a Hereford cow by Mr. J. Foster, of Benton county. Considering how desirable it is that the comparative values in Oregon of all the distinctive breeds of domestic animals should be ascertained by such means as are at the disposal of the experiment station of the State agricultural college, where facilities are at hand for measuring, weighing, feeding and testing various animals which cannot be expected to be possessed by any ordinary farmer, special attention is here called to the generous gifts above mentioned, not only as a due recognition of the kindness and thoughtfulness of the donors, but in the hope that many who read this report may make up their minds to "go and do likewise."

One point in passing may be allowed. The grading up of the marketable fat cattle of Western Oregon, to say nothing of the vast herds of Eastern and Southern Oregon, would in a very few years produce for market at two and one-half years old, at least the same average weight as now sold by the farmer at three and four years old, with a corresponding increase in weight if the improved graded animals were held until three or four years old. A similar increase of value in wool and mutton would certainly follow the exercise of the same care in breeding and caring for the improved breeds of sheep. One of the functions of the experiment station is to ascertain and publish facts on these and kindred subjects, so that the farmers of Oregon may have, free of charge to them, experience which, without the experiment station, would have to be dearly paid for. The distribution of the funds of the experiment station has not yet permitted the development of these experiments, but it is intended to give special attention to them in the near future.

Another line of experiments is being undertaken this fall which promises to be of great benefit to the farming community. Several fields, of four or more acres in each, will be laid down in grasses in various proportions, and with various quantities of seeds, and the results tabulated to ascertain the best varieties and the most advantageous quanties of seed, under the conditions of the Willam-

ette valley. These fields will be used both for hay and for pastures and the different results ascertained and published.

In the horticultural department the planting out of many different varieties of vegetables, small fruits, fruit trees, forest trees, native and foreign, and ornamental shrubs and flowers, has been continued during the past year. The results, so far as ascertained during the season of 1889, were published in station bulletin No. 4, which was widely distributed among the farmers and fruit growers of the State. The vegetables are tested with the special view of ascertaining the comparative value of the leading varieties for our climate and soil, and also to determine how methods of cultivation affect different varieties. The points to be specially noticed in small fruits are hardiness, productiveness, quality and variability. The improvement of native and cultivated varieties by cross fertilization is also studied.

The collection, planting and propagating of large numbers of the various fruit trees of advantage to Oregon has also been carried on, and in the coming fall and winter another orchard, specially for experimental purposes, will be planted out on the new college farm on ground near the new barn. Many of the forest trees and ornamental trees, shrubs, vines and climbers, which were named in station bulletin No. 4, and which have now completed another season's growth, will also be set out on the farm and grounds during the coming fall.

In this department there are now growing the following number of varieties of fruit:

Apples	92
Blackberry	4
Quinces	3
Gooseberry	6
Strawberry	24
Pears	21
Peaches	48
Grapes	25
Raspberry	5
Nuts	2

In the chemical department considerable work of general interest has been accomplished, or is in progress. Coöperative experiments on the sugar beet are being carried on, having for their object to determine the suitability of various sections of Oregon for sugar production. Many samples of beet, grown under various conditions, have been tested, and their saccharine product ascertained. Future bulletins will present the results of these experiments in such shape as to determine whether the conditions exist in Oregon under which the manufacture of beet-root sugar can be commercially profitable.

Several chemical analyses of ensilage have been made, with the object of determining the amount of substance digested by animals,

and also to ascertain the effect of heating by steam on the digestibility of ensilage.

Various analyses of fertilizers have been made, both to determine their correspondence with the guarantees under which they have been sold, and also to develop their use in wheat cultivation.

The white soil of the Willamette valley has been chemically tested, to find out its possibilities of improvement by cultivation and artificial fertilization.

Many analyses of varieties of wheat have been made in order to ascertain the variation caused by climate and soil.

Repeated experiments have been made with plants reputed to be poisonous to stock, but so far the chemical department has not succeeded in killing any of the animals experimented on; on the contrary, they have appeared to thrive under a diet in which "larkspur," in its various stages of growth, or "camas root," or "wild parsnip," or "cow parsnip," formed a considerable item. Since every spring large numbers of cattle do die when first the new growth of wild vegetation makes its appearance. The causes of these losses can be and will be determined; but the results of the experiments so far are purely negative.

Various substances have been sent in to the station chemist from different localities in Oregon to be by him tested. When time has permitted, and when the question appeared to be one of general interest rather than of private profit, it has been the policy of the board to have such examinations made. In this line tests have been made of samples believed to be fire clay and lime rock. Altogether thirty-five analyses have been made, comprising over 500 separate determinations and requiring over 1,000 weighings.

The work of the entomologist and zoölogist to the station is of much public interest. Prof. Washburn has succeeded in inducing belief through an increasing circle of correspondents that their communications will receive prompt attention and intelligent replies. His collections of injurious and of harmless or beneficial insects attracted much attention both at the Salem State fair and at the Portland exposition. The results of the careful experiments of this department, having for object the extermination of the codlin moth, have been published in bulletins Nos. 3 and 5, and the instructions for action on the part of the orchardists there given have been followed with success in many instances, although very much remains to be done before it can be claimed that anything like a fair general trial has been given in any one of the great fruit-growing districts to the plans of spraying and stem and branch cleansing to get rid of this great pest. Experiments with the grain weevil, and with corn worms, currant worms, cut worm and many injurious insects

have been and are continuing to be made. Correspondence has also been had with farmers as to damage to land and crops by gophers and ground squirrels and by birds of various kinds. It is hoped that any one who desires information on any of the matters within the range of this department will not hesitate to write or come to the college if within reach. So much as an outline of the work accomplished at the experiment station during the past fiscal year.

The board of regents controlling the Oregon experiment station are glad to see that their views on one important subject entirely agree with those recently expressed by Prof. W. O. Atwater, the United States director of experiment stations at Washington, D. C.

"The expenditure of both college and station funds by the college authorities involves some delicate questions of adjustment. For instance it frequently happens that the same person renders service to and is paid by both institutions, as when an officer of the college shares in the work of the station. Such an arrangement may be advantageous to both college and station and entirely proper, provided the interests of the station call for the work, the person has the time and the qualifications needed, the college pays a due equivalent of salary for the service it receives and the station receiving a due equivalent of service for the salary it pays."

In organizing the staff of college and station the board of regents, by adopting this principle, were enabled to secure men for the service of both institutions of a more expensive class than the funds of either would have permitted standing alone.

That the station has had its due proportion of service during the year 1889–90, so far as the regulations of the board could secure that end, will be seen from the following tables showing the total salaries paid and the proportion paid by the station and the amount of time of the station force necessarily employed in college recitations during the year in question. Allowance must, of course, be made for time also consumed in preparation for these classes, especially in the chemical department. The balance represents the time at the disposal of the station force as such.

Name and Office.	Total Salary.	Amount Paid by Station.
E. Green, director and agriculturist	$ 2,000 00	$ 1,500 00
H. L. French, superintendent of farm	900 00	900 00
E. R. Lake, botanist and horticulturist	1,600 00	1,000 00
P. H. Irish, chemist	1,600 00	1,000 00
W. D. Bigelow, assistant chemist	1,600 00	1,000 00
F. L. Washburn, zoölogist and entomologist	1,200 00	600 00
George Coote, foreman in horticulture	900 00	450 00

Name.	Office in college work.	Total average time employed in college class-rooms during 1889 and 1890.
E. Grimm	Professor of agriculture	Two hours per day.
H. T. French	Superintendent of farm	None.
E. R. Lake	Professor of botany and horticulture	One hour per day.
George Coote	Foreman in horticulture	None.
P. H. Irish	Professor of chemistry	One and one-third hours a day.
W. D. Bigelow	Assistant to professor of chemistry	One hour per day, one term.
F. L. Washburn	Professor of zoölogy and entomology	One hour per day.

The recent organization of college and station as a State institution and the disproportion between the amounts available for expenditures, and the wide area, and many developments of work that needed to be covered sufficiently, account for the inability of the station forces to undertake many investigations and experiments which present themselves as of importance to the community and within the lines laid down by congress for the work of experiment stations. The work of the stations would be more conveniently and therefore better done if better facilities could be commanded. For instance, a detached building, designed for the purpose, should be erected for the station work. This is a more urgent necessity from the rapid increase in the number of college students. Four rooms in the college building have been hitherto devoted to the station work or for the use of the station staff, but with nearly 200 students in the college these rooms are now needed for college purposes as class and recitation rooms. This same necessity has been felt, and this action has been taken already in most other States.

Since the United States government supplies the $15,000 for the support of the station on condition that the State should supply the buildings needed for the station work, and since the necessity for the new buildings has arisen from the successful and rapid development of the agricultural college of Oregon it is earnestly hoped that the legislature of Oregon will accede to this appeal, and appropriate not less than $10,000 for the erection and fitting of the station building with chemical, entomological, botanical, horticultural and agricultural laboratories and store rooms.

Reference was made in last year's report to the desire of the board of regents to establish at least two sub-stations at points to be selected in Eastern and Southern Oregon. So far the way has not been clear to do this. The central station has absorbed all the attention and money at the disposal of the board. It was recognized that there was great danger of inefficiency of work and dissipation of funds if distant centers of work were selected and opened up too soon. But though deferred, the opening up of experiment work in Eastern and Southern Oregon is by no means abandoned.

In conclusion the board would point out afresh to the citizens of Oregon how earnest is their wish for the extension of the functions and usefulness of the experiment station. The bulletins to be issued periodically in the now current year will both be more numerous, and larger issues of each one will be published. Correspondence with all parts of the State on questions within the very extended field of the experiment station work is again invited. All letters should be addressed to the agricultural college experiment station, Corvallis, Oregon.

W. S. LADD,
President of the Board.

WALLIS NASH, Secretary.

APPENDIX.

The following is a short synopsis of the ground covered by the bulletins 1 to 7, inclusive, issued by the Oregon experiment station during the first two years of its organization, 1888–9 and 1889–90.

1. October, 1888.—By E. Grimm, director. States the establishment of the station. Reprints the Hatch act appropriating $15,000 annually to the support of experiment stations in each State or Territory. Refers to the enforced delay in getting to work; states that no time has been lost in making all preparations. States the subjects which will "receive the attention of the station at present are the following: Study of the soils found on the farm and in different parts of the State. This will include a study of their natural conditions; the effect of drainage; of different modes of tillage, etc.; best methods of maintaining and increasing their fertility and the use and value of fertilizers. Additional work is planned in experimentation with different varieties and methods of cultivation of grains, grasses, roots and forage crops; on the sugar beet, with a view to increasing its sugar contents; with different varieties of apples, prunes and peaches, studying the conditions most favorable for their highest development; on old orchards, including cultivation, best methods of protecting from moss; with forest trees and native grasses and clovers. In addition to this our chemist will make a thorouh study of the chemical composition of our grains, from different parts of the State, of fodders and of mineral waters. Thorough investigation of our insect pests and noxious weeds will be made; and of the diseases to which our plants are subject with remedies for the same. As 'climate affects the composition of the soil, limits the various crops and determines the nature of the live stock suited to a given place,' we hope soon to make the study of climate an important part of the work of the station. * * * * It will be seen that certain branches of agriculture, of great importance to our State, are not included in the above plan, such, for example, as the investigation of the relative value of the various

breeds of cattle for the purpose of the dairy or for beef; relative cost of producing milk, butter, cheese, etc., and the most economical method of feeding to secure the best results." These are not included in our scheme of work because it is impossible with our present equipment to do anything of value upon them.

2. January, 1889.—E. R. Lake, botanist and horticulturist. Horticultural: Preparations and notes on proposed work. States that coming to the work late in September, finding scarcely any approaches, and neither land nor material suitable for the season's planting or seeding, it had been impossible to do more than get in readiness for the operations attendant in spring-time. But the mark of preparation had been so nearly completed in some directions that certain experiments could soon be commenced. States preparation of grounds round the college buildings for experiments with lawn grass seeds, mixture of the same and ornamental trees and shrubs. Other portions of the grounds had been underdrained and subsoiled for testing vegetables and small fruits.

Forcing house 24x18 built and equipped and store room, tool room, potting room and general workshop 16x18, with basement, costing $600. Seed testing had been commenced and results on 12 varieties of beans, 13 of beets, 2 of brocoli, 1 brussels sprouts, 27 of cabbage, 13 of carrots, 7 of cauliflower, 2 of celery, 7 of corn, 9 of cucumber, 13 of lettuce, 12 of onions, 11 of peas, 19 of radish, 5 of rutabaga, 14 of squash, 4 of tobacco, 20 of tomatoes, and 14 of grasses and clovers, were published in this bulletin.

Gave the list of small fruits and of ornamental and root trees which would be planted out in the then coming spring.

3. October, 1889.—E. R. Lake, horticulturist and botanist. Horticultural: Practical work with insecticides, giving details of spraying with London purple and of the results of picking the fruit from sprayed and unsprayed trees.

Entomological. F. L. Washburn, entomologist. Corn worms: Description of insect and remedies for its depredations.

Insecticides. F. L. Washburn. Descriptions; instructions for using; dangers.

Spraying machines. F. L. Washburn. Description; cuts; prices.

P. H. Irish, Ph. D., chemist. Commencement of experiments on poisoning stock with various plants reputed to be poisonous.

4. January, 1890.—E. Grim, agriculturist. Agricultural: Notes on farm crops. States that in February, 1889, after due preparations and drainage, there had been sown 112 plats, of which 67 were grasses, 10 of clover, 7 of forage plants, 13 of wheat and 15 of oats. States that there was but one failure to record of the grass plats, and that (rescue grass) was due to poor soil. And, after a detailed and

interesting description of all the grasses, adds: "It is evident that a more extended study of our grasses is necessary, and it is the intention of the station to make a thorough study of the native and cultivated grasses under such conditions of farm practice as will bring out their true value." Of the clovers all did well and yielded a fair crop. Then refers to the setting out of thirty-one plats on the "white land"—and describes this land—mentions the thorough drainage and preparation of the soil, and describes orchard grass, tall oat grass, tall and field fescues, Italian and perennial rye grass, neluct grass and timothy, as all deserving special mention as doing well on this land, having shown remarkable growth and making a splendid sod. Adds that of the whole number of grasses and clovers only the lerome grasses failed. Then describes the forage crops; teosinte, spurry, seradella, tarweed, ioliason grass, saint-foin or esparsette, spring netches or tares. Then describes the 13 varieties of wheat grown on the station land, with remarks on each; the same as to 15 varieties of oats; then 3 varieties of buckwheat, and 41 of corn. Then follow tabulated notes on 79 kinds of potatoes and 24 of sorghum; and preliminary notes on 14 plats of rutabagas, mangels, carrots and sugar beets.

Horticultural: Notes by E. R. Lake on vegetables were prefaced by the remark that "owing to the extremely dry summer and to the fact that our land was in very poor condition, in consequence of much teaming having been done on it during the previous winter, we were unable to make many valuable notes, even comparative ones. Many of the different varieties were necessarily planted under very unequal conditions, and accordingly fair comparisons can be made with only a few."

Then follow notes on 12 kinds of vegetables. Then follows a list of trees, shrubs and house plants, to be found on the grounds and in the houses, and a list of orchard trees which it was proposed to plant out.

Chemical department: By P. Herbert Irish, chemist; W. D. Bigelow, assistant. Gives results of examination of a clay sent from Alsea as a fire clay; of a rock from Llewellyn, supposed to be a cement rock; of mineral water from Medical Springs, Union county. Then is given the results of the beginning of operations having for their end observations with regard to the effect of climate and soil upon the composition of wheat; 28 samples having been analyzed, calculated to air-dried substance, and separately to substance dried at 100° C. Then follows a description of a new apparatus for use in the determination of fat in plant substances; and then instructions for sampling mineral waters, and also soils for analysis.

5. April, 1890.—Entomology. F. L. Washburn, B. A. Remedies for the devastation of the codlin moth, and instructions for spraying and for "banding" the trees for catching the larvæ; advising the destruction of windfalls, and killing in storehouses, and disinfecting fruit boxes; description of and remedies against the woolly louse of the apple; against green aphis; the pear tree slug; the peach tree borer; the San Jose scale; the flat-headed apple tree borer; the gooseberry fruit worm; the current borer; the flea beetle; the pea weavel; the strawberry crown borer; cut worms; the grain beetle and grain weevil. Then follows some notes on gophers and rabbits.

Department of Chemistry. P. Herbert Irish, chemist; W. D. Bigelow, assistant. Analysis of bone meal in two samples and some observations on fertilizer analysis.

6. July, 1890.—Chemistry. P. H. Irish. Examination of cattle foods; notes on comparative digestibility of cooked and uncooked ensilage; digestion of raw ensilage; analysis of ensilage; composition of dung, calculated to same dried at 100° C.; digestibility of cooked ensilage and similar experiments.

Economic Zoölogy: F. L. Washburn. Giving the inquiries made and answers received as to injurious effects on stock, poultry, grain and fruit of foxes, skunks, minks, weasels, badgers, raccoons, squirrels, gophers, mice, moles, muskrats, bats; also as to birds; 1, imported Chinese pheasants; 2, woodpeckers; 3, owls; 4, hawks; 5, blackbirds; 6, king bird or bee martin; 7, shrikes; 8, Carolina doves; 9, pigeons; 10, quail; 11, grouse.

7. October, 1890.—Horticulture: George Coote, horticulturist. Notes on hardiness, quality, ripening in fruit, dates of maturity and marketing of small fruits, and some vegetables up to date, with outlines of further experiments and testing intended to be carried out.