MASSACHUSETTS

INSTITUTE OF TECHNOLOGY.

ANNUAL REPORT

OF THE

PRESIDENT AND TREASURER,

DEC. 14, 1892.

BOSTON:
THE COLLINS PRESS.
1893.

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To the Corporation of the Massachusetts Institute of Technology:—

The year upon which I am now to report has been one of steady growth, and, in the main, of prosperity. There has been an increase in the attendance at the Institute, which has required an increase in the instructing staff. Very important changes, long maturing, have been introduced into the curriculum which have enabled every department of the school to supply some urgent want of advanced or specialized instruction. A new building has been put up, which affords ample and pleasant quarters for the department of Architecture, while the withdrawal of that department from the Walker Building has left room for a much-needed expansion of the departments of Physics and Chemistry. All around, all through, the Institute of Technology has, I believe, grown larger and stronger in the twelve months now closing, except only in the matter of its finances. The new building has, indeed, been paid for, and a small fund provided for its maintenance. This is something; this is, in itself, much; and we have deeply to thank some of the friends of the Institute who have again shown noble generosity in our behalf; but towards the permanent endowment of the school we have made little or no progress. The millions which should furnish the means of present usefulness, the opportunity for continual expansion and improvement, and the security of the future, have not yet been placed in our hands.

I would not strike this note to weariness; but it is important that it should be understood throughout the community that the Institute of Technology is as yet substantially unendowed; and that, until very large sums have been added to our resources, the school must remain all the time in peril of its life, and those who direct its destinies must continually be in the mental attitude of shrinking under an impending blow. It needs not to be said that this is not a fortunate mental attitude for those who have to conduct a great work. If during these twenty-seven years the Institute of Technology has been a potent factor in the development of the educational system of America; if it has led the world in the introduction of laboratory practice in general chemistry, in physics, and in metallurgy; if it has done

well by its great army of students; if it has opened successful careers to hundreds upon hundreds of young men; if it has contributed freely to the development of the industries of Massachusetts and of New England; if it stands to-day the largest, most complete school of its class anywhere to be found, the acknowledged model upon which institutions are being organized, both in the New World and in the Old, — then it would certainly seem that, in a community so lavish in its beneficence, so intelligent in its selection of the objects of that beneficence, the Institute cannot long be suffered to lack that ample and substantial foundation which will not only afford security for its future, but will be the source of strength and confidence in the present daily conduct of its affairs.

Yet the year has not passed altogether without addition to our means. Since the date, Oct. 1, of the Treasurer's report, the sum of $20,000 has been received, in accordance with the bequest of the late T. O. H. P. Burnham, of Boston. Mrs. Susan Covell, of Springfield, has given the sum of $5,000 for the establishment of a perpetual free scholarship in memory of her nephew, the late William F. Huntington, a graduate of the Institute in the class of 1875. By the will of the late Prof. T. Sterry Hunt of New York, from 1871 to 1878 Professor of Geology in this institution, certain securities, the value of which is not yet ascertained, are bequeathed the Institute of Technology as a scholarship fund. The bequest of Mr. Samuel E. Sawyer, of Gloucester ($4,000), mentioned in my report of 1890, is still in litigation. Meanwhile one very important addition to our resources has been received through the act of the General Court of Massachusetts, of June 11, 1891, and a decision of the Supreme Judicial Court of the Commonwealth thereupon, to which I shall now refer.

In my report of last year, I noted the fact that the Massachusetts (Amherst) Agricultural College had brought a bill in the Supreme Judicial Court of the Commonwealth, asking that the State Treasurer be compelled to pay over to that institution the entire sum received and to be received under the act of Congress, approved Aug. 30, 1890, entitled "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 2, 1862." The case of the Massachusetts Agricultural College *vs.* Marden (State Treasurer) was argued in the Supreme Court in January last, and the court handed down its decision on the 29th of March following, dismissing the petition of the Agricultural College. The text of the decision will be found in the appendix to this report. It will be seen that the decision confirms every claim of the Institute. This decision left the act of the Legislature, approved June 11, 1891 (the text of which was printed in my last annual report), to go into effect; and the Institute of Technology has consequently received its one-third share of the first four annual instalments of the national grant, made to the State of Massachusetts under the act of Aug. 30, 1890. The aggregate amount thus received by the Institute is $22,000. The one-third share of the grant to come to us the present year will be $6,333.33, constituting a much-needed and most welcome addition to our resources.

THE GRADUATING CLASS.

Of the 132 graduating members of the class of 1892, 22 graduated in civil engineering, 26 in mechanical engineering, 4 in mining engineering, 12 in architecture, 7 in chemistry, 36 in electrical engineering, 6 in biology, 1 in physics; 7 graduated from the department of general studies, 4 in chemical engineering, 6 in sanitary engineering, and 1 in geology. All courses of the school were thus represented in the award of diplomas.

THE ENTERING CLASS.

The new year has witnessed a still further increase in the number of students in the school. The total registration this year, as by the catalogue now in press, amounts to 1,060, against 1,011 last year, a gain of 49. The following table exhibits the number of the students in the school each year, from the opening of the Institute to the present time: —

Year.	No. of Students.	Year.	No. of Students.
1865–66	72	1879–80	203
1866–67	137	1880–81	253
1867–68	167	1881–82	302
1868–69	172	1882–83	368
1869–70	206	1883–84	443
1870–71	224	1884–85	579
1871–72	261	1885–86	609
1872–73	348	1886–87	637
1873–74	276	1887–88	720
1874–75	248	1888–89	827
1875–76	255	1889–90	909
1876–77	215	1890–91	937
1877–78	194	1891–92	1011
1878–79	188	1892–93	1060

STUDENTS BY CLASSES.

The aggregate number of students for 1892–93 is divided among the several classes as follows: —

Graduate students, candidates for advanced degrees	3
Regular students, Fourth Year	138
" " Third Year	144
" " Second Year	175
" " First Year	314
Special students	286
Total	1060

Assigning the special students to classes, according to the predominant studies pursued by them, we reach the following statement of the division of the whole body among the several years:

Class.	Regular.	Special.	Total.
Graduates of the M. I. T., candidates for advanced degrees	3		3
Fourth Year	138	25	163
Third Year	144	99	243
Second Year	175	114	289
First Year	314	48	362
Total	774	286	1060

STATISTICS OF EXAMINATIONS.

Of the 1,060 students of the present year, 442 were not connected with the school in 1891–2; 18 had been connected with the Institute at some previous time, and returned to resume their places in the school; 40 were admitted provisionally, without examination; 1 was admitted by examination to the second year, 32 as special students; 67 were admitted on the presentation of diplomas certificates from other institutions.

Excluding from consideration those who were admitted but have not, in fact, entered the school, 65 in number, the following was the final result of the examinations held in June and September: —

Admitted clear	207	
" on one condition	49	
" on two conditions	21	
" on three conditions	8	
" more than three conditions	2	287
Rejected		54
		341

EXAMINATIONS AT DISTANT POINTS.

In addition to the entrance examinations held in Boston in June and September, 1892, examinations were also conducted, in June, at Albany, Chicago, Cincinnati, Denver, Detroit, Easthampton, Exeter, Montreal, New York, Philadelphia, Pittsburg, Poughkeepsie, San Francisco, St. Louis, St. Paul, and Washington.

RESIDENCE OF STUDENTS.

Thirty-nine States of the Union, besides the District of Columbia, Utah, and New Mexico, are represented on our list of students. Of the total number of 1,060, including special students, 606 are from Massachusetts, or 56.9 per cent of the whole; 124 are from other New England States; 330 from outside New England, of whom 23 are from foreign countries.

The following table shows the number of students of each specified class from each State or foreign country: —

States.	Candidates for Advanced Degree.	Fourth Year.	Third Year.	Second Year.	First Year.	All Regular Students.	Special Students.	Total.
Alabama	....	...	...	1	1	2	2	4
Arkansas	....	...	1	...	1	2	...	2
California	....	2	3	3	1	9	5	14
Colorado	....	1	1	1	...	3	4	7
Connecticut	....	3	6	3	8	20	7	27
Delaware	....	...	1	...	1	2	...	2
Dist. Columbia	....	...	2	...	2	4	...	4
Florida	....	1	1	1	1	4	...	4
Georgia	....	...	...	2	...	2	1	3
Idaho	....	...	...	...	...	...	1	1
Illinois	....	4	5	4	12	25	15	40
Indiana	....	...	2	1	1	4	1	5
Iowa	....	2	2	3	...	7	3	10
Kansas	....	...	...	...	...	...	1	1
Kentucky	....	1	2	...	1	4	3	7
Louisiana	...	...	...	...	...	...	2	2
Maine	....	6	2	6	17	31	8	39
Maryland	...	...	...	1	2	3	3	6
Massachusetts	3	87	79	103	195	467	136	603
Michigan	....	2	...	2	1	5	5	10
Minnesota	...	3	5	2	2	12	1	13
Missouri	....	2	...	1	6	9	4	13
Nebraska	....	...	...	2	1	3	1	4
Nevada	....	...	1	1	...	2	1	3
N. Hampshire	....	4	5	5	10	24	5	29
New Jersey	....	2	1	...	1	4	7	11
New Mexico	....	...	...	1	1	2	...	2
New York	....	4	9	6	14	33	17	50
North Carolina	....	...	...	...	...	...	1	1
Ohio	....	4	3	6	10	23	16	39
Oregon	....	...	...	...	2	2	...	2
Pennsylvania	....	3	4	8	4	19	6	25
Rhode Island	....	4	3	6	4	17	7	24
South Carolina	....	...	1	...	...	1	...	1
Tennessee	....	...	...	...	...	...	1	1
Texas	....	...	...	...	3	3	2	5
Utah	....	...	...	...	...	...	1	1
Vermont	....	...	...	...	1	1	3	4
Virginia	....	...	...	...	1	1	3	4
Washington	....	...	...	2	1	3	...	3
West Virginia	....	1	...	...	...	1	1	2
Wisconsin	....	...	2	...	4	6	3	9
Foreign Countries.								
Belgium	....	...	...	...	1	1	...	1
Bulgaria	....	1	...	...	...	1	...	1
Cent'l America	....	...	1	...	...	1	...	1
England	....	...	1	...	...	1	...	1
France	....	...	...	...	...	...	1	1
Hawaiian Isl'ds	....	...	...	...	...	...	2	2
Holland	....	...	...	2	...	2	...	2
Japan	....	1	...	...	...	1	...	1
Mexico	....	...	...	...	...	...	1	1
New Brunswick	....	...	...	1	...	1	...	
New So. Wales	....	...	...	...	...	...	1	1
Prov. Ontario	....	...	...	...	...	...	2	2
Prov. Quebec	....	...	1	...	3	4	1	5
Scotland	....	...	...	...	...	...	1	1
Spain	....	...	...	...	1	1	...	1
Turkey	....	...	...	1	...	1	...	1
Total	3	138	144	175	314	774	286	1060

A table showing the number of students in each year from and including 1886, coming from each State or Territory and from each foreign country, may not be without interest and instruction: —

States.	1886.	1887.	1888.	1889.	1890.	1891.	1892.
Alabama	...	...	...	1	...	2	4
Arkansas	2	3	2	2	3	3	2
California	8	9	13	10	14	19	14
Colorado	...	2	2	6	4	7	7
Connecticut	16	29	28	36	31	30	27
Delaware	1	...	...	...	1	...	2
Dist. of Columbia,	4	4	9	9	7	4	4
Florida	...	...	...	2	3	3	4
Georgia	3	2	1	1	2	2	3
Idaho	...	...	...	...	...	1	1
Illinois	19	29	37	33	34	32	40
Indiana	2	...	1	3	6	3	5
Iowa	6	3	6	4	9	10	10
Kansas	2	...	...	...	2	2	1
Kentucky	4	2	3	4	4	8	7
Louisiana	...	...	2	4	8	5	2
Maine	20	24	26	30	29	27	39
Maryland	2	2	4	4	7	7	6
Massachusetts	402	429	494	533	517	565	603
Michigan	5	10	12	13	16	13	10
Minnesota	4	6	8	10	12	13	13
Mississippi	1	...	...	...	...	..	...
Missouri	1	5	7	8	8	12	13
Montana	...	...	...	...	1	...	...
Nebraska	2	4	2	1	1	1	4
Nevada	1	...	...	...	1	3	3
New Hampshire	26	19	24	21	23	24	29
New Jersey	7	11	8	13	11	16	11
New Mexico	...	...	2	...	...	1	2
New York	24	35	31	25	40	40	50
North Carolina	...	...	1	2	1	1	1
Ohio	21	21	23	35	33	33	39
Oregon	1	...	1	2	1	1	2
Pennsylvania	13	18	18	23	22	26	25
Rhode Island	17	19	22	22	21	26	24
South Carolina	1	1	...	1	2	4	1
South Dakota	1	1	1	1	...	...	...
Tennessee	1	2	3	5	3	4	1
Texas	...	1	2	...	1	2	5
Utah	...	...	...	...	...	...	1
Vermont	3	7	5	4	4	5	4
Virginia	5	5	4	6	5	6	4
Washington	...	1	...	2	2	3	3
West Virginia	1	...	...	2	2	2	2
Wisconsin	3	5	7	9	10	7	9
Wyoming	...	...	1	...	...	....	....
Foreign Countries							
Argentine Rep.	...	...	...	...	2	....	....
Belgium	1	...	...	...	...	....	1
Brazil	...	1	2	2	2	4	....
Bulgaria	...	...	...	1	1	1	1
Central America	...	...	...	...	...	1	1
Colombia	...	...	...	...	1	2	....
England	...	...	...	...	2	1	1
France	...	...	...	1	1	1	1
Greece	...	...	1	...	...	....	....
Guatemala	...	1	1	1	...	....	1
Hawaiian Islands,	...	...	1	1	4	4	2
Holland	...	...	...	...	...	2	2
Ireland	...	1	1	1	1	....	....
Japan	1	1	...	1	4	3	1
Mexico	...	...	...	1	1	1	1
New Brunswick	1	...	1	1	1	2	1
New South Wales,	...	...	...	...	...	1	1
Nova Scotia	...	...	...	2	2	1	....
Peru	2	1	2	1	3	1	...
Porto Rico	...	1	2	2	2	1	....
Province Ontario	...	1	2	1	1	2	2
Province Quebec	3	2	1	1	4	4	5
Scotland	...	...	1	1	3	2	1
Spain	...	...	...	...	...	....	1
Trinidad	...	1	1	1	1	1	....
Turkey	...	1	1	2	1	2	1
Venezuela	...	...	...	...	...	1	....
Total	637	720	827	909	937	1,011	1,060

RESIDENCE OF MASSACHUSETTS STUDENTS.

It has been said that 56.9 per cent of our students are from Massachusetts. All the counties of the State, except the small counties of Dukes and Nantucket, send students to the Institute. One hundred and fourteen cities and towns are borne on the lists, four more than last year. The first column of the following table shows the number of cities and towns in each county sending pupils to the Institute; the second column gives the aggregate number

from each county. It appears that Suffolk and Middlesex send us 185 pupils each; Essex comes third, with 75; Norfolk fourth, with 72.

County.	No. of Towns.	No. of Students.	County.	No. of Towns.	No. of Students.
Barnstable	2	4	Hampshire	1	1
Berkshire	2	4	Middlesex	32	185
Bristol	6	13	Norfolk	19	72
Essex	18	75	Plymouth	10	28
Franklin	3	3	Suffolk	4	185
Hampden	4	15	Worcester	10	18
Total	35	114	Total	111	603

The following is a list of the towns, thirty-four in number, which send four or more scholars to the Institute: —

Boston	168	Malden	9	Medford	5
Newton	31	Salem	9	Quincy	5
Brookline	22	Framingham	8	Wellesley	5
Cambridge	22	Melrose	8	Woburn	5
Somerville	16	Reading	7	Concord	4
Chelsea	15	Watertown	7	Gloucester	4
Lynn	13	Wakefield	6	Hingham	4
Newburyport	13	Weymouth	6	Kingston	4
Lowell	11	Taunton	5	Marlborough	4
Hyde Park	10	Andover	5	Needham	4
Springfield	10	Arlington	5	Rockland	4
Waltham	10	Fitchburg	5		
Lawrence	9	Haverhill	5		

PROPORTION OF OLD AND NEW STUDENTS.

The following table exhibits, for each year since 1883, the distribution of the total number of students among two classes: first, those students whose names are found upon the catalogue of the year preceding; and secondly, those students whose names appear as new names upon the catalogue of the year to which the statement relates: —

Year.	(1) Total No. of Students.	(2) No. of Students in the Catalogue of the previous year who remain in the Institute.	(3) No. of New Students entering before issue of Catalogue.	(4) Of those in column (3) the following number are regular first-year Students.	(5) No. of New Students, not of the regular first-year class.
1883–84	443	231	212	140	72
1884–85	579	311	268	186	82
1885–86	609	369	240	177	63
1886–87	637	379	258	190	68
1887–88	720	396	324	229	95
1888–89	827	465	362	245	117
1889–90	909	557	352	255	97
1890–91	937	572	365	234	131
1891–92	1,011	624	387	258	129
1892–93	1,060	618	442	303*	139

It appears from the foregoing that the number of students remaining over has been decreased by 6, while the number registered for the first time is larger by 55, making the total gain, as previously stated, 49.

AGES OF STUDENTS ON ENTRANCE.

The next table exhibits the ages of our students upon entrance. The regular students of the first-year class number 314. From these we should except 17 cases of students of unusual ages. These deductions leave 297 as the number of students whose ages have been made the subject of computation.

The results appear in the following table, in comparison with the corresponding results for 1891–92 : —

* In addition, 11 students are repeating the first year.

Period of Life.	1891–92.		1892–93.	
	Half-Year Groups.	Yearly Groups.	Half-Year Groups.	Yearly Groups.
16 to 16½ years	..	..	3	..
16½ to 17 years	4	4	5	8
17 to 17½ years	26	..	18	..
17½ to 18 years	39	65	36	54
18 to 18½ years	41	..	49	..
18½ to 19 years	50	91	55	104
19 to 19½ years	35	..	58	..
19½ to 20 years	21	56	32	90
20 to 20½ years	18	..	25	..
20½ to 21 years	8	26	7	32
21 to 22 years	9	9	9	9
	251	251	297	297

From the foregoing tables it appears that the average age of the 297 students taken for this comparison, the present year, is 18 years and 10 months.

In this connection it may be interesting to note the ages at graduation of the class leaving us in June. The 132 members of the class were distributed among the several periods of life as follows:—

Under 20	2	Between 22 and 23	46
Between 20 and 20½	2	" 23 and 24	24
" 20½ and 21	10	24 and over	12
" 21 and 21½	14		132
" 21½ and 22	22		

PROPORTION OF REGULAR AND OF SPECIAL STUDENTS.

The following table exhibits both the absolute number of regular and of special students, as by the catalogue of each successive year since 1882, and the proportion existing between these two classes:—

Year.	No. of Regular Students.	No. of Special Students.	Total No. of Students.	Percentage.	
				Regular.	Special.
1882–83 . .	219	149	368	60	40
1883–84 . .	272	171	443	61	39
1884–85 . .	368	211	579	64	36
1885–86 . .	415	194	609	68	32
1886–87 . .	442	195	637	69	31
1887–88 . .	520	200	720	72	28
1888–89 . .	590	237	827	71	29
1889–90 . .	652	257	909	72	28
1890–91 . .	658	279	937	70	30
1891–92 . .	706	305	1,011	70	30
1892–93 . .	774	286	1,060	73	27

WOMEN AS STUDENTS IN THE INSTITUTE.

The number of women pursuing courses with us is 41. Of this number, 4 are graduates of colleges. Of the total number, 1 is a regular student of the fourth year; 5 of the third year; 3 of the second year; 4 of the first year. Twenty-eight are special students. Of the 9 regular students of the upper classes, 2 take Course IV., architecture; 2 Course V., chemistry; 1 Course VII., natural history; 3 Course VIII., physics; 1 Course XII., geology. Of the special students, 6 devote themselves to architecture; 3 to chemistry; 3 to physics; 11 chiefly to biology and allied subjects; 3 to English, history, or political science; 1 to geology, and 1 to mathematics.

GRADUATES OF OTHER COLLEGES.

Forty-nine graduates of institutions conferring degrees are included in our list of students for the present year. Of these, 6 are our own graduates, of whom 3 are pursuing studies as candidates for advanced degrees. Forty-three are graduates of other institutions pursuing courses of study with us, either as regular or as special students. Of these, 12 are graduates of Harvard University, 3 each of Amherst College, Smith College and Yale University, while 1 comes from each of the following institutions: University of Alabama, Boston University, Drake University, Johns Hopkins University, University of Minnesota, University of the

City of New York, Northwestern Universrty, Bowdoin College, Centre College, Iowa Agricultural College, Lafayette College, Maine State College, Marietta College, Middlebury College, Oberlin College, Ogden College, Robert College, St. John's College, Wellesley College, Michigan Mining School, National Institute, and Worcester Polytechnic Institute.

Of the 46, not candidates for advanced degrees here, 7 are regular students of the fourth year, — 3 in civil engineering, 4 in electrical engineering; 12 are regular students in the third year, — 1 in civil engineering, 3 in mechanical engineering, 4 in architecture, 1 in chemistry, 3 in electrical engineering; 5 are regular students in the second year, — 1 in mining engineering, and 4 in electrical engineering; the remaining 22 are special students.

Mr. J. A. Meyer, Jr., of the class of 1891, in architecture, Mr. F. E. Sanborn, of the class of 1889, in mechanlcal engineering, and Mr. P. A. Hopkins, of the last graduating class in architecture, are candidates for higher degrees. Mr. H. Gilmore, of the last class in mechanical engineering, has returned to take an additional year of study as a candidate for the bachelor's degree in electrical engineering. Mr. H. G. Dyar, of 1889, is taking special work in the Biological Department.

Messrs. H. B. Roberts, of 1890, and T. H. Skinner, of 1892, are continuing their studies here.

THE COURSES OF INSTRUCTION.

The following table presents the number of students in each of the regular courses of the second, third, and fourth years: —

Year.	Civil Engineering.	Mechanical Engineering.	Mining Engineering and Metallurgy.	Architecture.	Chemistry.	Electrical Engineering.	Biology.	Physics.	General Course.	Chemical Engineering.	Sanitary Engineering.	Geology.	Total.
4th Year Class .	27	33	6	6	8	40	2	..	6	8	..	2	138
3d " " .	23	29	5	14	13	30	3	4	5	15	3	..	144
2d " " .	26	44	8	17	14	42	4	1	5	11	2	1	175
Total . .	76	106	19	37	35	112	9	5	16	34	5	3	457

The following table shows the figures of the total line in the foregoing table, in comparison with the corresponding figures for the next eight preceding years: —

Year.	Civil Engineering.	Mechanical Engineering.	Mining Engineering and Metallurgy.	Architecture.	Chemistry.	Electrical Engineering.	Biology.	Physics.	General Course.	Chemical Engineering.	Sanitary Engineering.	Geology.	Total.
1884	29	54	28	9	20	30	1	1	3	..	..	..	175
1885	44	74	26	10	23	41	4	1	5	..	..	..	228
1886	45	75	19	13	24	52	4	2	8	..	..	..	242
1887	50	89	16	18	23	61	5	6	14	..	..	..	282
1888	71	100	12	21	28	74	4	5	12	11	..	..	338
1889	79	99	14	30	29	91	9	5	12	14	6	..	388
1890	79	95	18	27	27	105	11	4	13	18	7	3	407
1891	81	104	17	33	23	108	11	5	19	28	9	3	441
1892	76	106	19	37	35	112	9	5	16	34	5	3	457

It will appear from the foregoing table that the course in Electrical Engineering remains, as it has been for three years, the largest of the courses of the School. The courses in Mechanical and in Civil Engineering follow, in the order in which I name them. These three courses together comprise about two thirds of our regular students, candidates for the degree of the Institute. In the case of Course IV., the number of regular students fails to measure the importance of the department to the School, inasmuch as that course embraces a considerable number of college graduates and of young men who have had experience as draughtsmen and assistants in architects' offices, who are allowed to enter the department as special students, to get as nearly as possible what they require, without passing through the full course. Thus, the number of special students in Architecture the present year is sixty-one, which, added to the thirty-seven regular students, makes the total number ninety-eight. The Chemical and Biological courses also contain considerable numbers of special students, often of advanced grade, some of them teachers or persons who have been engaged in professional practice. In regard to the courses appearing as having a very small number of students, it should be said that the figures do not fairly represent the importance of these courses to the Institute. Thus, the Physics course, being a pure science course, has never had, and is not expected to have, a large number of students. Such

a result is not even desired by the Faculty. Yet that course has been a power for good in the Institute; some of our strongest students have graduated from it; and the influence of the instruction given in it and of the men taking it has always had a great effect upon the technical courses of the School.

The following table exhibits the number of persons who have graduated within each of the several courses, at each succeeding year since the first diplomas were conferred: —

Year.	Civil Engineering.	Mechanical Engineering.	Mining Engineering.	Architecture.	Chemistry.	Metallurgy.	Electrical Engineering.	Natural History or Biology.	Physics.	General Course.	Chemical Engineering.	Sanitary Engineering.	Geology.	Total.
1868	6	1	6	..	..	..	..	..	..	1	..	..	..	14
1869	2	2	..	..	1	..	..	..	..	..	..	..	..	5
1870	4	2	2	..	1	..	..	..	..	1	..	..	..	10
1871	8	2	5	..	2	..	..	..	..	..	..	..	..	17
1872	3	1	5	..	3	..	..	..	..	..	..	..	..	12
1873	12	2	3	1	7	..	..	..	..	1	..	..	..	26
1874	10	4	1	1	..	..	..	..	..	2	..	..	..	18
1875	10	6	6	1	1	..	..	..	1	2	..	..	..	27
1876	12	9	7	..	5	1	..	2	3	4	..	..	..	43
1877	12	6	8	4	2	..	..	..	..	..	..	..	..	32
1878	8	2	2	3	3	..	..	..	..	1	..	..	..	19
1879	6	8	3	1	3	..	..	1	1	..	..	..	..	23
1880	3	..	3	..	1	..	..	..	..	1	..	..	..	8
1881	3	5	6	3	8	..	..	1	..	2	..	..	..	28
1882	2	5	5	3	6	..	..	1	1	1	..	..	..	24
1883	3	7	5	1	3	..	..	..	..	..	..	..	..	19
1884	5	6	13	..	12	..	..	..	..	..	..	..	..	36
1885	4	6	8	2	4	..	2	..	..	1	..	..	..	27
1886	9	23	7	1	7	..	10	1	..	1	..	..	..	59
1887	10	17	8	1	9	..	8	1	1	3	..	..	..	58
1888	11	25	4	5	10	..	17	3	1	1	..	..	..	77
1889	15	23	5	3	8	..	17	1	1	2	..	..	..	75
1890	25	27	3	5	13	..	18	3	2	6	..	..	..	102
1891	17	26	4	6	11	..	23	3	3	1	7	..	1	102
1892	22	26	4	12	7	..	36	6	1	7	4	6	1	132
Total,	222	241	123	53	127	1	131	23	15	38	11	6	2	993
Deduct names counted twice														4
Net total														989

Our special students, of course, cannot be classified systematically; but the following table exhibits the number of such students pursuing each particular branch of study: —

NUMBER OF SPECIAL STUDENTS ATTENDING EXERCISES IN THE FOLLOWING DEPARTMENTS OF STUDY OR PRACTICE.

Applied Mechanics	54	History	50
Architecture	61	Language	146
Biology	28	Mathematics	163
Chemistry	84	Mechanical Engineering	68
Civil Engineering	27	Mining Engineering	8
Drawing	163	Physics	142
Electrical Engineering	18	Political Science	32
Geology	33	Shop-work	68

It may be of interest to note the number of students, either regular or special, pursuing certain leading branches of study, in each of the four years, as follows: —

Studies.	First Year.	Second Year.	Third Year.	Fourth Year.	Total.
Mathematics	367	239	158	51	815
Chemistry	386	63	48	31	528
English	341	219	16	9	585
French	249	141	42	9	441
Physics	...	265	190	124	579
German	62	181	132	4	379
Shop-work	14	114	47	45	220

The number of students in the five-year courses is 50, against 41 last year. The following table shows the distribution of this total by years and by courses: —

FIVE-YEAR COURSES.

Year.	Total.	Course.										Course Undetermined.
		I.	II.	III.	IV.	VI.	VII.	IX.	X.	XI.	XII.	
First	7	..	..	..	..	..	..	..	..	..	..	7
Second	19	1	8	1	4	4	..	..	..	..	1	..
Third	13	3	1	..	3	1	1	1	2	1	..	..
Fourth	7	..	3	..	3	1	..	..	..	..	..	..
Fifth	4	1	2	..	..	..	..	..	1	..	..	..
	50	5	14	1	10	6	1	1	3	1	1	7

CHANGES IN BUILDINGS AND ROOMS.

The Department of Architecture having entirely outgrown its previous quarters, the Corporation have this year erected a new building to be wholly devoted to it. This building has been carefully planned to meet the needs of instruction, and is fitted with every material appliance required for the fullest and best professional and technical training. It measures 66 feet by 58, and has a basement and five stories.

One half of the basement is a museum for building appliances; the other half is a laboratory for the testing of cements, mortars, etc., and has also a complete plant for experimenting on the siphonage of plumbing traps. This system is arranged to be in exact accordance with the plumbing practice in private houses, in order that the experiments may be thoroughly practical and useful.

The first floor is devoted to lecture rooms. The second and fourth floors are large drawing rooms, lighted from both sides. One half of the third floor is a drawing room, the other half contains the library. The library is very fully equipped and catalogued, and has every convenience for ready consultation of its eight hundred volumes and ten thousand photographs. The fifth and upper story constitutes one large drawing room, arranged for the classes in freehand drawing from the cast and from life, and for the classes in water color and modelling. The lighting of this room has had the most careful study, and its arrangement of skylights and sidelights is unsurpassed. The heating and ventilating apparatus of the building is so planned that the rooms are kept at a constant regular temperature by means of electrical appliances, and the air is constantly changed without the necessity of an open window. This noble and commodious building has been erected on the land immediately south of the Engineering Building, and in form constitutes an extension of the front of that building, with which it immediately connects and with which it communicates on each floor.

The removal of the Department of Architecture from the Walker Building to its new home gave room for a much-needed expansion

of the departments of Chemistry and Physics. The space thus left vacant was given entire to these departments, except that a single suite of rooms on the second floor was reserved for modern language recitation rooms. This occasion was taken for a considerable rearrangement, as well as enlargement, of both departments. These changes in the use of the Walker Building are so intimately connected with the increasing specialization of the work of instruction and research, that I shall describe them in detail while speaking, a little later, of the changes and developments of the year in Courses V., VI. and VIII. Suffice it to say here that the gain has been very great; greater than would appear probable from the mere extent of additional space acquired. We have been enabled to undertake work from which we have heretofore been debarred by the lack of just these facilities, while other work which we have previously undertaken we are now able for the first time to do to our entire satisfaction. The influence upon both the outgoing department of Architecture and the remaining departments of Chemistry and Physics, due to the enjoyment of something like adequate space, has suggested to our minds the daring speculation, what if the Institute of Technology were to have all the room it needed, and were to be in possession of the material means for doing all the good it is qualified and prepared to do! The subject is too vast for treatment, and I drop it here with the bare suggestion.

In the Engineering Building the only notable change of the year has been the painting in white of the larger part of the interior, adding greatly to the light available for work in the drawing rooms and laboratories during the short winter afternoons.

THE LIBRARY.

The report of the librarian, Mr. C. W. Andrews, contains the following statistics: —

The total accessions for the year have been 4,254, of which 1,470 have been received as gifts or in exchange; 2,354 obtained by purchase; 430 by binding periodicals and pamphlets. The net accessions have been 4,107, of which 3,320 are volumes and 787 pamphlets. The distribution and cost, including binding, of the accessions and the total number of volumes in each department library are shown in the following table: —

Library.	Vols. added.	Pphs. added.	Cost.	Pamphlets (bound and unbound) already catalogued.	Total No. of vols.
General	311	213	$178 41	1,772	2,619
Engineering	510	115	1,020 00	964	3,783
Mining	149	30	189 12	147	1,165
Architectural	142	3	453 40	5	950*
Chemical	398	105	748 49	951	5,061
Biological	126	82	164 99	183	1,259
Physical	314	31	659 53	232	3,304
Political Science	756	194	698 07	1,766	5,151
English	439	2	321 34	31	1,496
Geological	145	12	131 51	48	1,300*
Margaret Cheney Room,	30	0	.....	8	543
Total	3,320	787	$4,564 86	6,107	26,631

The total number of pamphlets is unknown, but it certainly exceeds ten thousand.

The total number of periodicals received, excluding annuals, is 373. Of these, 229 were subscribed for at a cost of $1,188.24; 69 were received in exchange, and 75 as gifts. The number of duplicate copies received is 16, and the number of separate periodicals, 362. The distribution of these periodicals is shown in the following table: —

Library.	By Subscription.	Total.	Cost.
General	10	32	$34 36
Engineering	36	83	223 15
Mining	16	19	81 50
Architectural	14	17	94 75
Chemical	35	58	206 80
Biological	26	30	155 50
Physical	20	34	123 00
Political Science and English	64	87	242 68
Geological	2	7	14 50
Lowell School of Design	6	6	12 00
Total	229	373	$1,188 24

* The numbers marked with an asterisk are only approximate, as these libraries have not yet been catalogued.

During the year 5,787 cards have been added to the main catalogue, which now contains 23,107 cards, covering 25,029 volumes and 6,107 pamphlets. The Engineering Library and that of the Margaret Cheney Room have been catalogued.

While as many gifts of single books have been received as in previous years, there has been but one gift of a considerable number, viz., 34 volumes on chemistry from Dr. B. S. Shaw, of Boston. The purchase of books on highway engineering, from the Pope Fund, has been continued.

THE CORPS OF INSTRUCTORS.

The catalogue of 1892-93 shows the number of instructors of all grades to be 109, inclusive of those concerned with the mechanic arts, but exclusive of those who are announced as lecturers for the year only. The addition of these would raise the total to 125, made up as follows: —

Professors	16
Associate Professors	11
Assistant Professors	11
Instructors	41
Assistants	30
Lecturers for the year	16
	125

The following table shows the gain or loss in the several classes during the year: —

	1891–2.	1892–3.
Professors	12	16
Associate Professors	13	11
Assistant Professors	8	11
Instructors	42	41
Assistants	27	30
Lecturers	18	16
	120	125

The instructing staff for 1892–3 is distributed as follows among the several departments of the School.

	Civil Engineering.	Mechanical Eng. and App. Mechanics.	Mining Engineering and Metallurgy.	Architecture.	Chemistry.	Physics and Electrical Engineering.	Biology, Zoölogy, etc.	Mineralogy, Geology, and Geography.	English, History, and Political Science.	Language.	Mathematics.	Drawing and Descriptive Geometry.	Mechanic Arts.	Military Tactics.
Professors . . . . (16)	1	1	1	2	2	1	1	1	2	1	2	..	..	1
Associate Professors . (11)	3	2	1	..	1	1	..	..	1	..	2	..	..	..
Assistant Professors . (11)	..	3	..	1	2	..	..	1	..	2	1	1	..	..
Instructors . . . . (41)	3	2	1	1	8	6	1	1	3	2	6	4	3	..
Assistants . . . . (30)	3	10	..	1	7	2	2	..	..	..	..	2	3	..
Total . . . . (109)	10	18	3	5	20	10	4	3	6	5	11	7	6	1
Lecturers . . . . (16)	1	..	1	4	2	4	2	..	1	1	..	..	..	..
Total . . . . (125)	11	18	4	9	22	15	6	3	7	6	11	7	6	1

These tables show that, with 1,060 pupils, we have one instructor to 10 pupils, if the lecturers for the year be excluded from the account; one instructor to eight and a half pupils, if the lecturers be included. Either mode of computation shows a very large proportion of instructors, made necessary both by the nature of much of the work pursued in the school, where only a small group of pupils can work with an instructor over a machine, or around a bench or desk, and by the highly specialized instruction given in the later years which tends to form in some cases extremely small sections.

CHANGES IN THE FACULTY AND THE CORPS OF INSTRUCTORS.

The changes in the faculty and the corps of instructors, during the year, have been more important than those which have occurred in any previous year since I assumed the duties of President. Some of these changes are more deeply to be regretted than it would be possible to express in words. Two professors of the highest eminence have been lost to the faculty of the Institute; one by resignation, the other by death.

M. Jules Luquiens came to the Institute in 1874 as instructor in modern languages; in 1880 he was promoted to be Assistant Professor; in 1884, to be Associate Professor; while in 1892 he was advanced to a full professorship, which he has resigned to accept the professorship of the Romance Languages in Yale University. Prof. Luquiens's superb scholarship will find a far wider field at New Haven than could be afforded it in the elementary instruction to which he was necessarily confined here; but he cannot be more highly esteemed and appreciated there than he was by the faculty and the students of the Institute of Technology. Eminently and in every sense a scholar, he was also a most successful teacher. If I were to select one quality out of the many which made him so useful and so honored in his service with us, it would be his conscientiousness in the discharge of every duty. It was impossible for him to slight any part of the work which devolved upon him, however tedious, however seemingly insignificant. Prof. Luquiens has carried with him to his new field of labor the gratitude and affection of all his former associates and of a host of "Institute men."

M. Jean Eugène Létang came to this country and to the Institute of Technology in 1871. One of the most brilliant of the pupils of the Ecole des Beaux Arts, the traditions of whose accomplishments still linger in that greatest school of art, he had been selected as Prof. William R. Ware's assistant in architectural design. It was necessarily a venture fraught with uncertainty to bring such a man hither; but the result has been a great uplifting of architecture in the United States. Hundreds of his pupils are now leading architectural practice in the great cities of our country. Shy, incapable of or altogether averse to lecturing, his chosen field was the drawing room, where, bending over each student in succession, he brought into play his rare powers of criticism, correction, and instruction. Returning to Boston after a summer abroad, he resumed his duties for the current year, only to be stricken down by disease which terminated fatally on the 28th of November. He has died, lamented by hundreds of pupils who will never cease to feel that to him they owe the inspiration which has given life to their professional careers. To fill his place in the Institute is a problem of the greatest difficulty and nicety, to which Prof. Chandler and the Executive Committee are giving the most earnest attention.

During Prof. Létang's sickness of six weeks, his classes were taken by Mr. Samuel W. Mead, of the firm of Cabot, Everett & Mead, architects, of this city. Mr. Mead, one of the earliest recipients of the Rotch scholarship, has been well trained in classical studies, and is in full sympathy with the thorough, thoughtful, academic spirit which has characterized the drawing-room work of the Institute under Prof. Létang. Mr. Mead will remain in charge of this department for the remainder of the year.

The Chemical Department of the Institute has been immensely strengthened for the current year by the consent of Prof. Crafts to assume, for that period of time, the charge of the instruction and laboratory work in organic chemistry. Such a re-enforcement is far beyond anything we had a right to expect, and has given strength and inspiration, not to the department alone, but to the whole school. Dr. Arthur A. Noyes, for several years instructor in analytical chemistry, has been appointed instructor in organic chemistry, to conduct the laboratory work under Prof. Crafts's direction, relieving Mr. Clement W. Andrews, to enable that very efficient officer to devote more time to the library of the Institute.

Dr. Thomas Evans, a graduate of the University of Erlangen, has been appointed an assistant in this department.

Ever since the foundation of the Institute, instruction in military tactics has been given in the school, as provided by the act of Congress of July 2, 1862, under which we receive a portion of our annual income. The requirement of military instruction has always been honestly dealt with here, a substantial course being given, without interruption, to the students of the first year. During the summer of 1891, the Executive Committee of the Corporation determined that it was best, in view of the large number of students in the first year, that the instruction in military tactics should hereafter be given by an officer of the United States Army as contemplated, although not required, by the act of 1862. They accordingly addressed the Honorable Secretary of War with a request for the detail of an officer for this service. Some delay occurred in making the detail, but in February, 1892, Lieut. Harry L. Hawthorne, of the 4th Artillery, was assigned for this service. Lieut. Hawthorne reported a little later, relieving in this duty Gen.

Hobart Moore, who had for many years given the instruction in this department with the greatest care, pains, and effort, and with all the success which it was reasonable to expect under civilian management.

Lieut. Hawthorne entered the Naval Academy at Annapolis in 1878, graduating in 1882. He was on sea service until June, 1884, when he passed his final examinations for appointment as an officer of the navy. The navy at that time affording opportunity for commissioning but a small part of the graduates of the Academy, he was honorably discharged from the service under the act of Congress, approved Aug. 5, 1882. Passing examinations at once for the military service, he was commissioned second lieutenant of the 2d Artillery in October of 1884. He took part in the operations against the Sioux Indians in the winter of 1890–91, and commanded the artillery in the fight at Wounded Knee Creek, Dec. 9, 1890, where he was severely wounded. For gallantry and ability displayed on this occasion, he was recommended for brevets of first lieutenant and captain; was mentioned in General Orders from the Headquarters of the army; and was presented with a medal by Congress. He received his commission as first lieutenant, Aug. 28, 1891.

Lieut. Hawthorne entered upon his duties, with the rank of Professor in the Faculty, about the middle of March; and took up the problem of instruction in military tactics in a school of this character, — for the problem must necessarily vary greatly with the varying character of schools, — with much intelligence, spirit, and activity. I cordially invite the attention of all members of the Corporation to this feature of the Institute, confident that they would be deeply interested by a visit to the school for this purpose alone. By a favor which cannot be too highly appreciated, and for which Gen. Dalton and his Excellency Gov. Russell have our hearty thanks, the battalion is allowed to drill three times a week, namely, Tuesday, Thursday, and Saturday mornings, from nine to ten o'clock, in the State Armory on Irvington Street. The list of instructors in military tactics from the beginning has been as follows : —

1868–1872, Gen. Hobart Moore, Instructor.
1871–1876, Lieut. E. L. Zalinski, U. S. A., Professor.
1876–1878, Lieut. H. W. Hubbell, Professor.
1878–1879, Lieut. Robt. W. Carter, U. S. A. (retired), Instructor.
1880–1883, Col. John C. Chadwick, Instructor.
1883–1892, Gen. Hobart Moore, Instructor.

The other changes in the Faculty have been: —

The promotion of Associate Professors Dewey and Levermore to be Professors of Economics and Statistics and of History, respectively.

Of Assistant Professor H. W. Tyler to be Associate Professor of Mathematics.

Of Instructors, Henry P. Talbot, Dana P. Bartlett, Edward F. Miller, and Frank Vogel to be Assistant Professors of Analytical Chemistry, Mathematics, Steam Engineering, and Modern Languages, respectively.

Still another change has been wrought by death in the instructing staff of the Institute. On the 14th of August, Mr. George V. McLauthlin, instructor in biology, was drowned at Nahant, while bathing off the shore. Mr. McLauthlin, a native of East Bridgewater, Mass., graduated from the course in Chemistry with the class of 1888. After engaging in practical chemical work for two years, he was in 1890 appointed assistant in biology, and in May last was promoted to be instructor, with reference to the coming year. From his entrance into the biological laboratory he displayed extraordinary ability as an investigator and as a teacher, and at the time of his death was regarded as one of the rising men of the Institute of Technology. His industry was remarkable, his insight quick and keen; while his attachment to his chosen profession was earnest and entire. For the State Board of Health, under the direction of Prof. Sedgwick, Mr. McLauthlin made several important investigations. In particular may be mentioned his careful study of the local conditions of the public spring waters sold in Massachusetts, of which a report is now issuing from the press, and an inquiry into the causes of the excess of typhoid fever in certain cities of the State. At the time of his death he had completed a special report to the State Board of Health upon an outbreak of typhoid fever in Chicopee Falls, which he traced and proved to be due to the use of

infected drinking water. A full account of this investigation will appear in the report of the Board for 1892.

In the Mathematical Department two new instructors were appointed for the current year; one to fill the vacancy caused by the assignment of Dr. Tyler to the secretaryship of the Institute, the other with a view to increasing the number of sections for the purpose of embracing fewer students in a section. The gentlemen appointed were Mr. Leonard M. Passano, A. B., of the class of 1889, Johns Hopkins University, and Mr. William H. Metzler, A. B., of Toronto University, both of whom have had valuable experience in teaching before coming to the Institute.

The proposed increase in the number of mathematical sections was effected as follows: in the third year from eight to nine; in the second year from ten to twelve; in the first year from sixteen to eighteen. This increase of sections called for seventeen hours more of class-room exercises per week in the first term, and of fourteen hours more in the second term. But, while the proposed increase of sections was duly carried out, no general reduction in the size of the sections has resulted. This negative result is due to the increase of the classes. In the first year the effects of the increase in the number of sections was more than offset by the great gain in the number of students. It is much to be hoped that the financial means of the Institute will, another year, be such as to allow still further additions to the instructing staff in mathematics. Mr. Frederick S. Woods of this department is still absent, pursuing advanced studies in the University of Göttingen, Germany.

Considerable attention has been given to the formation and arrangement of a special mathematical library, and a number of English and American text-books have been secured to supplement the mathematical instruction in elementary branches as well as more advanced treatises in English, French, and German. The department hopes to secure during the present year a representative collection of mathematical models.

The Annual Catalogue for the current year contains an announcement of an important increase in the requirements in mathematics for admission. Beginning with the examinations of June, 1894, candidates will be required to present either the portions of

algebra now included in the first-year course or, at their choice, solid geometry. The announcement is accompanied by a statement that the Faculty hope to see their way, at no distant date, to embrace both these requirements in the conditions of admission. The step already taken cannot fail to have an important effect upon the future rearrangement of the mathematical courses of the school, and upon the relation of our mathematical work to the technical instruction given in the several engineering courses.

In the department of Modern Languages two new appointments were made with reference to the present year. Unfortunately both were to fill vacancies, those, namely, caused by the resignations of Prof. Luquiens and Mr. Heller. It is much to be regretted that the means of the Institute did not permit the appointment of one or even two additional instructors in modern languages. Such action cannot long be delayed. The existing staff are laboring hard to carry the weight imposed upon them by a considerable increase of students, over the large numbers of last year. In addition to the two appointments referred to, however, some relief has been obtained by giving the class in Spanish to Mr. Johann Meyer for the present year.

The Instructors appointed as above were Mr. Ch. H. L. N. Bernard, from the High School of Oswego, and Mr. Joseph Blachstein, who has for some years been engaged in giving private instruction in Boston.

It is believed that the larger requirements in French (or German) for admission adopted last year will soon yield valuable fruit in better work at the Institute. The Faculty are also favorably disposed towards a still further increase in these requirements at no distant date. Such a school as this ought to receive only pupils who can read ordinary French and German works fluently and correctly, so that the instruction in the Institute itself may be reserved for higher study of these languages and the acquisition of a complete mastery of technical vocabularies. Towards that desirable end we already see progress making through the efforts of the Association of New England Colleges.

The assignment of a suite of rooms on the second floor of the Walker Building to the Modern Language Department, heretofore

mentioned, has been found of great benefit. The teachers in this department are thus brought nearer together, affording opportunities for easy consultation regarding the progress of different sections of the same class, or regarding students requiring particular attention. Moreover, a common room for the teachers in the department has been provided, where all can meet and each can keep his records and other papers. It is much to be regretted that several other rooms are not available for similar purposes in the various buildings of the Institute.

Of the Instructors of last year, the following have resigned: —

Mr. Arthur L. Williston, Mechanical Engineering.
Mr. Edward V. French, " "
Dr. Edward G. Gardiner, Biology.
Mr. Collier Cobb, Geology.
Mr. Otto Heller, Modern Languages.

Messrs. Williston and French have engaged in professional practice; Mr. Heller has become Assistant Professor in Washington University; Mr. Collier Cobb, Assistant Professor in the University of North Carolina.

To fill the vacancy caused by Dr. Gardiner's resignation, Mr. Richard E. Edes has been appointed Instructor in Biology. Mr. Edes graduated from the biological department of Johns Hopkins University in 1889.

Mr. Edward Robinson, of the class of 1890, has been appointed Instructor in Mechanical Drawing.

The following named gentlemen, Assistants last year, have been promoted to be Instructors, viz.: —

Harry M. Goodwin, in Physics.
William Lincoln Smith, in Physics.
Hamilton Rice, in Drawing and Descriptive Geometry.

Mr. Goodwin, at the time of his promotion, was granted leave of absence to enable him to pursue advanced studies in Physics in Germany. He is now at the University of Leipsic. It is hoped that this brilliant young scholar will return to continue his work of instruction at the Institute.

The appointments of two Instructors in Mathematics and of two

in Modern Languages have been mentioned in connection with the remarks on the instruction in those departments.

The list of Assistants for the current year is as follows: in Civil Engineering, Nathan R. Pratt, Joseph P. Lyon, Macy S. Pope. In Mechanical Engineering and Applied Mechanics: Carleton A. Read, James Swan, Fred A. Wilson, Phillips P. Bourne, Charles E. Fuller, William A. Johnston, Walter M. Newkirk, Charles F. Park, Dwight P. Robinson, Edward C. Wells. In Architecture: Robert S. Shedd. In Chemistry: Willis R. Whitney, Oscar W. Pickering, L. Kimball Russell, G. Russell Lincoln, Thomas Evans, Jesse F. Johnson, Herbert R. Moody. In Physics and Electrical Engineering: Louis Derr, George V. Wendell. In Biology: Severance Burrage, Albert P. Mathews. In Drawing and Descriptive Geometry: O. W. McD. Cushing, Walter B. Trowbridge. In the Mechanic Arts: James D. Littlefield, Clarence M. Brockway, Charles L. Conant.

THE EARLIER CHOICE OF COURSES.

A very important change in the policy of the school has been the adoption of the rule that students shall make their choice of courses at the opening of the second term, instead of at the opening of the second year, as heretofore. This rule takes effect at once. The Faculty have long desired to bring this about, but not until now have they seen their way to effect it. The advantages looked for from this change are as follows: —

(1.) The students will come earlier under department supervision. Each student will, from the close of the first term, belong to a department, to the head of which he may resort for advice or needed assistance. The heads of departments, on the other hand, will begin looking after their own men one term earlier.

(2.) The interest of the student in the school and in his own work will be increased as he feels himself a member of a distinct course and sees himself ranked as such, instead of being merely one individual in a great unclassified body of students.

(3.) The long novitiate of the first year will now be abridged one half, and the students will earlier get a taste of professional study, although the main part of their work will necessarily still be

of a preparatory character. This last result cannot be avoided until the Institute is able largely to increase the requirements for admission.

(4.) There will be a better adaptation of the studies of the second term to the subsequent work of each student. For example, heretofore it has been necessary to extend one and the same chemical course throughout the first year. Those who were, in the result, to go into an engineering course, or into architecture, have been obliged to take a somewhat longer and a somewhat different course than would have been given them in the interest of general training, or with reference to their subsequent studies. Men, on the other hand, who were in the result to enter some chemical course, such as chemistry, metallurgy, biology, or geology, have been given a somewhat shorter and a somewhat different course than might have been thought desirable. In other words, the chemical work of the second half of the first year has thus far been in the nature of a compromise, precisely meeting the needs of neither the "chemical courses" on the one hand, nor the "mathematical courses" on the other. Under the new arrangement, the chemical work of this term will be adapted to the requirements of each group of students. The architectural students will drop chemistry entirely at the close of the first half-year, putting the time thus saved to use in drawing. The students of the course in General Studies take physical laboratory work the second half-year in place of chemistry, securing thus, it is believed, a more varied training in experimentation and observation.

The change fixing the choice of courses at the middle of the first year has enabled the Faculty to change the instruction in first-year drawing and descriptive geometry in several important particulars.

First, heretofore the sections of the class have been so large that most of the work has been done in the drawing room, and very little in the class room. In future the class will be divided into small sections, so that each student can have a fair share of the instructor's attention, and the student will receive the benefit of a class-room drill to teach him the principles underlying any special plate before he proceeds to draw it.

Second, inasmuch as the students of the separate courses are in separate sections, instruction is now to be adapted to the needs of each course. Thus, for the students of Courses V., VIII., XII., and the fourth option of Course III., the course in drawing and descriptive geometry will be substantially the same as before. For Course II., the first three options of Course III., and for Courses I., II., VI., X., and XI., the study of descriptive geometry will begin at the middle of the first year, and the student will thus become familiarized earlier than heretofore with the principles of the subject, and will be taught from the first to make drawings in all four angles, instead of confining him to the first angle. In this way, he will be better fitted for the kind of drawing which a mechanical engineer has to perform, and be better prepared for his professional work in the second year. For Course IV., a larger amount of time is given to drawing in the first year, thus enabling the student to complete the study of descriptive geometry in that year. Much more time will be given to the architectural students in free-hand drawing. For Courses VII. and IX., the descriptive geometry is to be omitted, chart and map making being substituted for it in the latter.

PRINTED NOTES FOR STUDENTS' USE.

One of the most difficult problems in a school of such aims as those of the Institute of Technology is that which relates to the text-books to be used by the students. In the earlier years of the course, and in departments like those of mathematics, language, and political science, suitable text-books can be procured; but much of the matter of technical instruction which is given here is not found in books at all; or, if found there, is already antiquated through the progress of experiment and research. In such lines, the best available books must be supplemented at great inconvenience by a wealth of material from current scientific journals and the proceedings of learned societies and engineering institutes. Even these will not suffice for all the purposes of a school which aims to lead engineering practice, and in whose laboratories absolutely new work is continually in progress. For a long time we felt ourselves too poor to deal with the subject as was to be desired; and the best

books to be obtained, often painfully backward and deficient, were supplemented, as far as might be, by "hectograph" notes, tables, and diagrams, sometimes difficult to be deciphered and trying to the eyes and the patience of the students. About 1886, however, the Executive Committee authorized the printing of small bodies of the most urgently needed notes, with lithographic or heliotyped illustrations. The advantages resulting from the use of the new pamphlets were so conspicuous that the practice rapidly extended, the notes being sold to the students at prices which were estimated sooner or later to repay the cost of printing and engraving. The following table shows the growth of this system, whose results have been inexpressibly beneficial to the several departments of instruction: —

	Receipts.		Expenditures.
1888 . .	$1,552 32	1888 . .	$1,772 30
1889 . .	1,799 63	1889 . .	1,657 62
1890 . .	1,662 69	1890 . .	1,861 38
1891 . .	2,176 00	1891 . .	2,401 21
1892 . .	2,339 95	1892 . .	2,522 23
	$9,530 59		$10,214 74

The notes thus printed for students are in editions calculated to last, in general, three years. At the end of that time, it is considered that a new issue, containing modifications and additions, to bring the notes up to date, will be necessary. Often at the end of the first or second year extensive interlineations or supplementary pages are required.

A rough count made of the different books and pamphlets of such origin now in the hands of our students, omitting all mere tracts of a few pages, and all series of engraved plates not bound up, shows the number to be forty, with an aggregate of 3,759 pages, 475 plates, and fully twelve hundred illustrations.

So far has this been carried, that the text-books in use at the Institute may largely be said to be of our own making. The gain to the efficiency of instruction and to the convenience of the students has been very great, with an actual saving in expenditure to the latter. Indeed, it may be said that in some departments we could not give the courses we do without this aid. In addition to

the foregoing, scores of books prepared by our own teachers and published in the usual way are in use in the school.

SUMMER SCHOOLS.

The Summer School in Topography, Geodesy, and Geology. — This school was again held, during the past summer, at the Delaware Water Gap during four weeks in June. In the absence of Profs. Burton and Niles, it was conducted by Prof. Porter, Prof. Crosby also being present during part of the time, and Messrs. Robbins and Verges assisting throughout the work. Sixteen students were in attendance. The ground covered by the plane table work adjoined that surveyed the previous year, extending for half a mile farther inland from the river and on to the hilly ground. We now have a map of between one and two square miles of area, minutely portraying the topographical and other details, and of special value in studying certain geological features of the locality.

Repeated measurements were made of a base-line some 2,000 feet long, using suspended metallic tapes and specially designed apparatus for regulating the tension. Experiments were also carried on with brass and steel tapes suspended side by side for determining the actual temperature of the tape, the coefficients of expansion having previously been accurately determined by experiments in the laboratory, by means of special apparatus designed under the direction of Prof. Burton. The heights of various prominent points were determined by barometric measurements, using both mercurial and aneroid barometers. Attention was also given to the solar attachment and to range finders and other instruments. The geological work embraced, as usual, a general study of the geology of the surrounding country in its relations to the topographic features, but especial attention was given to the construction of an accurate geological section about two miles long across the Kittatinny Mountain and Kemmersville anticline to Cherry Creek. The bearing of such a section upon practical engineering was made apparent to the students by doing the work substantially as if it had been proposed to locate a tunnel along the line of the section, the extent and character of each stratum which such a tunnel would

penetrate being determined. Excursions were also made to the Bangor slate quarries, to the great terminal moraine, and to various localities of paleontological interest.

The hydraulic work embraced a series of measurements of the volume of the Delaware River, made at three different gauging stations, so chosen as to give practice both in moderate and in swift currents. The measurements were made with sub-surface floats, as well as with the Ellis and the Fteley current meters. The observations there made have been worked up in the drawing room during the present term. The last two days of the course were devoted to a trip up the Lehigh Valley, stopping at Bethlehem, where special courtesies were extended by officials of the Bethlehem Steel and Iron Works, and at Mauch Chunk, where visits of inspection were made to mines, canals, the gravity railroad, and other engineering works.

Summer School of Mining. — This year the Summer School of Mining was held at Drifton, Penn., at the collieries of Coxe Brothers & Co. The students spent a month in making surveys below and above ground, as well as in making a special study of the methods of mining, moving, cleaning, and shipping the anthracite in preparation for the market. The collieries are among the finest in the country, both as to equipment and management. A warm welcome was given the students by Mr. Eckley B. Coxe, who not only opened the various departments freely to them, but delivered lectures upon the latest theories of colliery management, making this summer an important factor in the education of these young engineers. The Summer School was in charge of Profs. Richards and Hofman.

Summer Field Work in Mineralogy. — This was held in July, one week being spent by Prof. Crosby with sixteen students in visiting the noted localities in Paris, Me., and the adjoining towns. The students became greatly interested in the work, and the session, although brief, was in every way successful and satisfactory.

Courses I. and XI. Civil and Sanitary Engineering.

The course of study in civil engineering has been altered only in regard to a few minor matters. The staff of professors and instructors is the same as last year, except that two new assistants take the place of two retiring ones. Both of the new assistants were enabled, through the efforts of the department, to spend last summer in practical professional work with special reference to their duties here.

The graduates of the year in civil and sanitary engineering, as usual, obtained positions without difficulty; the number of applications received by the department has largely exceeded the number of men available. There has this year been an especially great demand for teachers of civil engineering. Since the close of last year, applications have been received for eleven teachers of civil engineering, several of these applications being from schools of high standing; yet only one could be filled. Two graduates from the Civil Engineering Department are now instructors in Cornell University, namely, Mr. Sherman, 1890, and Mr. Mott, 1889. Another graduate of this department, Mr. Brownell, 1890, was this year appointed instructor in civil engineering in Brown University.

The foregoing leads me to say that it is to be regretted that so few of our graduates, in all departments, are disposed to teach. That indisposition comes chiefly from the strong proclivity towards professional practice which is created by the large amount of experimental and practical work, which, at the Institute, is, from the first and all through our courses, associated with the theoretical instruction and the text-book exercises. Instead of shrinking back from the labor and responsibilities of practice, after four years of student life, our graduates are eager to go to work, and like nothing so well as to take hold at once of practical problems. This is good. It is, indeed, a characteristic feature of the school which we would not willingly lose. Yet, with the large and rapidly growing demand for teachers of physics, chemistry, and natural history in the secondary schools of the country, and with the not infrequent calls made upon us for men to become professors of engineering in the new technical schools now arising in all parts of the country, or in the older universities which are establishing technical departments, it would be a fortunate thing if, without impairing the promptitude and resolution with which the average graduate of the Institute takes hold of his professional work, we could find in each graduating class a small number, and those of the very best, who were willing to devote their lives to the honorable and beneficent career of teaching.

The instruction in highway engineering has been extended, and a set of notes prepared by Mr. Foss was printed and

used by the students last year. Two graduating theses were prepared which dealt specially with highway work: one being a study for the subdivision and laying out of a large tract of land; the other an investigation of the durability and physical properties of various kinds of paving brick. A foundry rattler was added to the engineering laboratory for use in connection with this latter thesis.

Special lectures were given during the year by Mr. John R. Freeman on hydraulics of fire protection and on fireproof construction, and one by Mr. F. P. Stearns, Chief Engineer of the State Board of Health.

Notes have been prepared and published for the use of the classes as follows:

(1.) A revised edition of Prof. Swain's notes on the Theory of Structures, for the third and fourth year classes.

(2.) Notes on Warped Surfaces, for the students in Stereotomy, by Prof. Porter.

(3.) A set of printed tables, prepared by Mr. E. B. Weston, giving friction losses in pipes, reprinted by permission from a report of the city engineer of Providence, for the use of students in hydraulic engineering.

(4.) A set of notes on Highway Engineering, prepared by Mr. Foss.

The equipment of the Hydraulic Laboratory has been increased during the past year by the addition of several important pieces of apparatus, among them one for the study of the discharge through diaphragms inserted in pipes, and another for the study of the conditions attending the flow through a branch inserted in a pipe. A large steel measuring tank with a capacity of 280 cubic feet has also been added. During the year experiments were also arranged for the study of the discharge through nozzles. The equipment of the laboratory will be still further increased this year. A three-inch Venturi meter, with registering apparatus, has been recently ordered of the Builders' Iron Foundry, in Providence; and the department has received as a loan from Mr. John R. Freeman a valuable collection of apparatus, used in his recent experiments on the flow of water through pipes, together with a very delicately constructed Pitot tube arranged for measuring the velocity at different points in the cross section of a pipe.

The laboratory has also received from the estate of the late James B. Francis, through the courtesy of his son, Col. James Francis, a very valuable collection of apparatus, used many years ago by Mr. Uriah Boyden and by Mr. Francis, consisting principally of a large number of beautifully made brass orifices of various forms. Col. Francis has also presented to the Institute a number of the original drawings of turbine wheels, made by Mr. Uriah Boyden.

Acknowledgment should also be made of the loan of a fifteen-inch Hercules turbine wheel, by the Holyoke Machine Company, of Worcester, which is used in connection with class-room instruction; also of a part of the apparatus used in the official tests of water meters by the commission appointed by the city of Boston in 1887, loaned by Mr. N. M. Lowe. Prof. C. Herschel Koyl has also presented the Institute with one of his parabolic semaphore signals, which has been set up in the third-year drawing room, where it is suitably illuminated.

The hydraulic field-work has, during the present year, been carried on at Lowell, through the courtesy of Col. Francis, gaugings having been made of the water flowing in the large Merrimack flume.

The outfit of geodetic and surveying instruments has not been materially increased. The apparatus for the accurate measurement of base-lines with the steel tape, designed under the direction of Prof. Burton, has been perfected, and was used in the summer school in the measurement of a base line about 2,000 feet long. This line was measured with a probable error of 0.016 inch, or one in one and a half million.

The library has been increased by the addition of a large number of valuable books and periodicals, among which may be mentioned a complete set, from the beginning (1877), of the "Revue Générale des Chemins de Fer," consisting of nineteen volumes. The library has also been enriched by the addition of a large number of sets of reports from the leading railroad companies in the United States and Canada, some of these sets being complete. Among these may be mentioned a complete set of the reports of the Pennsylvania Railroad, since 1847.

A large number of books relating to roads and highways have

been purchased with a portion of the fund contributed by Col. Albert A. Pope; and it is intended that the Engineering Library shall contain every book or pamphlet of importance on the subject of roads which it is possible to obtain.

A rather striking piece of testimony as to the professional value of the preparation received at the Institute is afforded by an article in a recent number (Oct. 20, 1892) of the *Engineering News*. This article gives the result of a comparison made by the editor between the number of students of civil engineering graduating, from 1860 to 1884, from the different schools in the country, and the number of such graduates who have attained to membership in the American Society of Civil Engineers. It appears, from the statements of the article in question, that the membership of this society is closely restricted.

"For the past fifteen years, at least, it has not been possible for any one to obtain admission to the society as a member, — however great his standing or acquirements in other lines, — unless he had risen to the rank of Chief or Principal Assistant Engineer, or had held a nominally lower rank on large works which was equivalent in responsibility to the positions named in smaller works. In other words, the intention has been — and with some possible individual exceptions, the practice — to admit no one as full member unless his past record warrants the belief that he is already fitted by experience to take charge of engineering works of some magnitude and importance."

Under these conditions, the editor deems the comparison referred to above a fair one, as showing, in regard to the body of graduates from each school, "the successful fraction of the engineering profession, namely, those who have followed the strict line of their profession with relatively greater persistency and success." The result of the comparison made, as the editor states it, is that "the Massachusetts Institute of Technology heads the list with the magnificent percentage of 32.2. The Rensselaer Polytechnic Institute of Troy follows with 21.5; while Washington University, St. Louis, is a strong third, with 20 per cent."

Course II. Mechanical Engineering. The most marked development in the department which should be noted this

year is that of the option in Naval Architecture, which is in charge of Prof. Peabody. When it is considered that it is only four years since this subject was first mentioned in our catalogue, it is truly remarkable that so near an approach has been made to a complete and thorough course. It would be difficult to find any other direction in which the Institute could develop which would have a greater promise of usefulness than this. The building of ships, both in the navy and in the merchant service, now imperatively demands men who are properly educated for the work. The day when that work could be done by those who had grown up from the condition of apprentices has passed by. This fact is fully recognized, and yet the number of young men so educated is exceedingly small, and the few Americans who have been educated at either the English or the French government school of Naval Architecture are in great demand.

The end which has been kept constantly in view, in developing this Option at the Institute of Technology, has been a course which should accomplish substantially the same results as the English and French government schools. Meanwhile we have sought to prepare our students to take positions, at first, as assistants in this kind of work, with, however, such an equipment and training as will qualify them to rise to positions of the largest responsibility after they have been in practice long enough.

After four years of effort and experiment in the direction of a substantial course in naval architecture, it has seemed appropriate to indicate to the Corporation as nearly as possible the point that has actually been reached in the development of these studies and exercises. I have, therefore, asked Prof. Lanza to give me the data for a somewhat extended statement regarding this branch of instruction at the Institute, in immediate comparison with what is known concerning the corresponding schools of the countries previously referred to.

In the foreign schools the student is given a very large amount of pure mathematics, with courses in mechanism, thermodynamics, and steam engineering, and in applied mechanics. The studies also embrace marine engineering, since the naval architect of to-day who is to engage in large works must be a marine engineer,

as well. In regard to all these subjects it may be said that, with the exception of the pure mathematics, they are taught as fully in our own course in Mechanical Engineering as in the English and French government schools of Naval Architecture, and in some cases, especially in thermodynamics and steam engineering, there is reason to believe that the work takes an even more practical and useful turn here, greater pains being taken to familiarize the student with the results of experiments up to date than is done in the foreign schools mentioned. In addition, our students have a good drill in work in the engineering laboratory, and are given two years of shop-work.

Next, as to the naval architecture proper: The time devoted to this study with us has this year increased, and now amounts to 420 hours. The class-room work is as follows: —

(*a*) Description of methods of building ships of iron and steel; including the transverse and longitudinal framing, and the fitting of ballast tanks and double bottoms; the laying out and erection of the framing, and the application of plating; and a discussion of bulkheads.

(*b*) Proofs and application of rules for finding the area, moment, moment of inertia, centre of gravity, and radius of gyration of lines, areas, and volumes, by Simpson's rule, the trapezoidal rule, and by the use of the Amsler-Laeffel integrator.

(*c*) General discussion of the properties of floating bodies, with a special application to ships. Discussion of the curves and surfaces of buoyancy and flotation, the metacentre and metacentric curves, statical and dynamical stability, including "metacentric stability." Application of the metacentric method to inclining experiments, for the determination of the centre of gravity of ships already built; to the discussion of variations of stability due to the addition or removal of weights, and to the effect of moving weights on the trim of the ship. Discussion of the effect of carrying fluids in tanks wholly or partially filled; the effect of filling wholly or partially the water-ballast tanks or the various compartments of the ship. The reserve of stability, or the effect of sudden forces, such as gusts or squalls of wind, on the safety of a ship under sail.

(*d*) Methods of finding the statical and dynamical stability of ships proposed by Barnes, Benjamin, Spence, McFarlane-Grey, Daymard, and others.

(*e*) Methods of finding the weight and centre of gravity of the hull, equipment, and cargo; determination of the loads, shearing forces, and bending moments acting on the hull of a ship in still water, or when borne by waves.

(*f*) Method of determining the equivalent girder for the hull of a ship, and the stresses on the hull produced by the weight of the hull, the equipment, and the cargo.

(*g*) Some discussion of waves and rolling of ships.

The drawing-room work is as follows: —

(*a*) Laying out and fairing the lines of a ship.

(*b*) Calculation of a displacement sheet, in the ordinary form.

(*c*) Drawing of curves of displacement, tons per inch of immersion, centre of buoyancy, areas of water lines, and transverse metacentre.

(*d*) Determination of metacentric stability.

(*e*) Calculation of statical and dynamical stability by Barnes' method and by the method in use at the Bureau of Construction and Repair of the Navy Department.

(*f*) Calculation of weight and centre of gravity of hull, equipment, and cargo.

(*g*) Calculation of stresses in the hull.

The above includes all the work done in the English government school, except the discussion of the rolling of ships in still water and among waves, which is a subject of less importance than the others, and one in which we can as yet do only a small amount of work, but which we shall take up more fully hereafter. While the amount of time spent in actual drill in doing the detail work is probably less with us than in the English government school, it is believed that by judicious management we can accomplish the object of putting the student in a condition where he will take hold of any of the work with a full understanding of what he is doing.

In the French school the instruction involves but little dock-yard or shop-work experience. In the English school the students have had, before they enter the school, at least five years in the dock-yard. They enter the yards at fourteen or fifteen years of age, and are made to work there in the shops and in the building of ships; receiving meanwhile instruction in mathematics, in-

cluding the calculus, and also in other branches. Hence, so far as their mathematics is concerned, they are as far along when they enter the school of Naval Architecture as our men are at the end of their second year, and they have also had some shop-work and done some of the work of shipbuilding. This dock-yard experience we cannot give; but, on the other hand, our men have our second and third year shop-work, and have also had the very great, the almost priceless, advantage of laboratory training in chemistry, mechanics, and physics, through which they acquire the ability to conduct measurements with care and precision, to perform experiments, and to undertake investigations. We are doubtless behind these foreign schools in the subject of pure mathematics; but this we hope will be remedied when our requirements for admission are raised.

From the foregoing it would appear, according to such light as we have on the subject of what the foreign schools are doing, that the Institute of Technology is now giving to its students as full a course in the theory of naval architecture as is given in the foreign schools, with the exception of a few things of minor importance, which will, however, be supplied in the immediate future; that our students are required to do the work of every part of the problem of designing a ship; that the resources of the department are such that the methods are all modern and the material worked upon is modern; that, by way of compensation for the lack of dock-yard experience, our students have some shop-work, and also have a large amount of chemical, physical, and engineering work in the several laboratories of the school. By way of material it may be said that we have most of the modern books on the subject, and that we have also a considerable amount of drawings, specifications, and lines of large and very modern steamers, naval and merchant, which material has been worked up into such shape that it can be, and is, freely used by the class.

It would be perfectly proper to consider the work done by the students in the naval architecture option in the light of a four years' course by itself, since it fulfils the purpose of such a course. It follows, therefore, that the work done in marine engineering should be mentioned, as this is closely allied to the work in naval architecture proper. This work includes: —

(*a*) Descriptions of marine and stationary engines in all their details, including the most modern types.

(*b*) The usual discussion and calculation of the strength and the proportions of the parts of marine engines.

(*c*) Discussion of the probable behavior of the steam in cylinders with different combinations and arrangements.

(*d*) Discussion of the effect of the reciprocating parts in combination with the preceding, with the object of determining the greatest stresses on the parts of the engine.

(*e*) Comparison of these results with the results of the usual methods.

(*f*) Discussion of paddle-wheels and screw-propellers.

The last four, viz., (*c*), (*d*), (*e*), and (*f*), include a large amount of drawing-room work and calculations by the students. With reference to this work the Institute is provided with a considerable amount of material, including a considerable number of modern books, and a large number of drawings, of which the most valuable are: —

(*a*) Drawings of the engines and boilers of the "Sagamore," a steam yacht built in 1889 at the Bath Iron Works; 48 drawings.

(*b*) Complete drawings of the machinery of the cruiser "Cincinnati," now building at the Brooklyn Navy Yard, including the engines (triple expansion of the latest type), boilers and location; about 193 drawings.

(*c*) Complete drawings of the boilers and engines of the three tug-boats built for the Treasury Department at City Point in 1891; 72 drawings.

(*d*) Drawings of an 18,000,000-gallon triple-expansion pumping engine, built by E. P. Allis & Co.

The credit for building up and developing both the course in Naval Architecture and that in Marine Engineering is mainly due to Prof. Peabody. It has involved, on his part, a very large amount of hard work and the exercise of a great deal of patience and of good judgment.

Delays which we have very much regretted, but which seemed unavoidable, have arisen in the completion of the Emery testing machine (300,000 pounds' capacity), so that it has only just arrived

from Philadelphia. It will be in place in season for the experimental work of the second term.

The publications made by different members of the department have been as follows: —

(*a*) Prof. Peabody has published his treatise on Valve-gears, which will enable a decided improvement to be effected in this part of the instruction.

(*b*) A paper was presented to the American Society of Mechanical Engineers by Profs. Peabody and Miller, giving an account of a very valuable series of tests on the triple-expansion engine in the laboratory.

(*c*) A paper was published in the *Technology Quarterly* by Prof. Sondericker, giving an account of a portion of his experiments on repeated stress.

The new sets of printed notes issued have been as follows: —

(*a*) Details of an eight-wheel locomotive by Prof. Lanza.

(*b*) A new and enlarged edition of Prof. Lanza's notes on Dynamometers, Planimeters, Governors, and Fly-wheels has been issued.

The department received in December, 1891, after the issue of the last report, a Wheeler condenser, having 150 square feet of cooling surface, presented by the Wheeler Condenser and Engineering Company.

Course III. Mining Engineering and Metallurgy. The additions recently made to the apparatus of this department have rendered our metallurgical plant fairly complete. A new ore-sampler, of a highly novel design by Prof. Richards, has just been finished and promises to be very useful. Prof. Hofman's new book on lead gives the latest facts and the best practice in the working of that metal. The conduct of the laboratory, under the personal direction of Profs. Richards and Hofman and Mr. R. W. Lodge, is all that could be desired. Our later graduates from Course III. are maintaining the high reputation won for the mining department of the school by the men of the first ten years.

Course IV. Architecture. Every effort has been made to prevent the instruction in this department from dropping down, even for a moment, in consequence of the death of Prof. Létang.

Prof. Chandler and his assistants have redoubled their attentions to the classes; while Mr. Mead, who undertook the charge of the work in architectural design upon Prof. Létang's sickness, has met with success far beyond our most sanguine expectations. Everything is being done, everything will be done, to save the students of the department from feeling that they have lost a single hour out of the year. Thus far things have gone smoothly. With greater facilities and ampler accommodations, we have been able to improve the courses in several respects. Last year, by special appropriation, the construction of diagrams and charts was carried so far that this year there is only needed such time to be given to them as can be spared from the duties of the regular assistants, whose skill and thoroughness leave nothing to be asked for. No department is destined to profit so largely as the department of architecture by the change, beginning the present year, through which students are to make choice of their respective courses at the end of the first term. This change has allowed some very important improvements to be effected in the architectural course, especially in the introduction of more of freehand drawing, and more of descriptive geometry.

The new building is proving to be wonderfully satisfactory. It is fitted with every material appliance required for the fullest and best professional and technical training. It has been furnished throughout by the generosity of Mr. Arthur Rotch. The number of students is about equal to that of last year, while there has been a distinct raising of the standard. More college graduates are in our architectural classes this year than ever before. The Technology Architectural Society has presented to the library Fossati's "Saint Sophia"; Adam's "Mediæval French Sculpture"; Gosset's "Les Coupoles d'Orient et d'Occident."

Postscript.—Since this report was made, the Corporation of the Institute has been informed of the acceptance by M. D. Despradelle, of the Associate Professorship of Architectural Design. M. Despradelle is from the Atelier Pascal, and was graduated from the École des Beaux Arts with distinction, at the unusually early age of twenty-five. He won nearly all the minor prizes of his time, and all but obtained the Prix de Rome, taking place as

Premier Second. Since graduation, M. Despradelle has already gained a position for himself in the profession. He is Sous-Inspecteur aux travaux des Bâtiments Civils des Monuments de l'État, and has the title of Architecte diplomé par le gouvernement, and also that of Architecte diplomé de la Société Centrale des Architectes Français. While M. Despradelle rightly feels that his future is an assured one in his present position, he has been attracted by the opportunities offered at the Institute of Technology, and has, as stated, accepted the Associate Professorship of Architectural Design. At such short notice M. Despradelle found it impossible to leave Paris in time to take up the work of our second term: but he will be with us in September. All that we have learned regarding M. Despradelle, both before and since the appointment, assures us that we could not have found in all France a worthier successor to Prof. Létang.

The Corporation and Faculty are under great obligations to Mr. Arthur Wheelwright and Mr. J. Randolph Coolidge, Jr., now resident in Paris, for most valuable advice and practical assistance in meeting this trying exigency of the Institute.

Course V. Chemistry. The changes in the Chemical Department during the past year have been numerous and important. The increasing number of students in the chemical laboratories, rising from 403 in 1890–91, to 449 in 1891–92, and to 528 in 1892–93, has necessitated a considerable increase in the space required for the work of the department, and this has resulted in a rearrangement of its work to a considerable extent. Few changes have been made in the topics taught, the only one of importance being the separation of the optical analysis of sugar from the organic laboratory work. Henceforth the former will constitute a distinct course, under the charge of Mr. Andrews.

In order to meet the increased demands caused by the number of students taking chemistry, the laboratories of the department have been rearranged to a considerable extent. The laboratory of general chemistry, which contained places for 320 students, was found too small last year, and during the summer its capacity was increased to 400, and this has proved only sufficient to meet the needs of the entering class. The space at the disposal of the de-

partment for laboratory work in general chemistry is now completely filled.

During the year the organic laboratory has been enlarged by the construction, in the upper hall of the Walker Building, of a convenient combustion room. The rooms heretofore occupied by Prof. Norton in the fourth story have been given to Prof. Pope and the instructors in general chemistry. The changes in the laboratories in the third story of the Walker Building have been extensive. Room 32 has been arranged as a private laboratory and office for Prof. Norton; while a portion of it has been made into a small recitation room, which was greatly needed by the department. Room 34 has been arranged as a storeroom for fine chemicals and apparatus, and as a preparation room for the large lecture room. The sanitary laboratory has been removed from room 34 to the larger and more convenient room number 38, and its capacity has thus been materially increased. Number 39 has been divided into an office room for Prof. Drown, and a spacious and convenient analytical laboratory which will be used by Prof. Drown and by advanced students in analytical chemistry.

Room 23 on the second floor has been arranged as a chemical and physical lecture room for the joint use of the departments of chemistry and physics. The seating capacity of the room is about seventy-five. A lecture room of this size has long been needed by these departments. The laboratories of sanitary chemistry have been used during the past year for the analysis of the waters of the State Board of Health as in previous years. Through the kindness of Henry D. Dupee, Esq., a number of interesting and instructive collections of chemical products exhibited in the Mechanics' Fair have been presented to the Institute, and will form a valuable addition to its collection. They will be placed in room No.30, which will be gradually transformed into a museum of chemical products.

Courses VI. and VIII. Electrical Engineering and Physics. No great change in the nature or arrangement of the work in these courses has been made during the past year; but there has been a steady gain in the quality of the instruction. Large additions have been made to the instrumental equipment of the

Rogers Laboratory, and various minor improvements in methods of instruction have been introduced. As a whole, the work done by the students has been better during the past year than ever before. A considerable amount of original scientific work has been carried on, and several papers from the department are ready for publication.

The very considerable accessions in the way of room which have been received by the department of physics during the past summer have come in good time to relieve a condition of increasing congestion which could not have continued longer without material injury to the work in physics and electrical engineering. These have allowed a large extension of our general laboratory space, and also enabled the department to set aside several rooms for work of a special character which could not be done properly in an apartment devoted to miscellaneous work. The principal changes are as follows: —

On the first floor, the small recitation room and the apparatus room, formerly occupying the space between room No. 10, the fourth-year laboratory, and the physical study, have been thrown into the former room, giving a spacious and well-lighted room, 108 feet in length and 29½ feet in breadth. This is devoted especially to the more advanced electrical work. A room of equal size for more elementary laboratory work has been secured on the opposite side of the hallway by throwing the room formerly occupied by the physical library into room No. 16. These two large rooms are admirably suited to their purpose of general instruction; and, so far as size, convenience, and abundance of daylight go, could hardly be bettered. Furthermore, the introduction of the electric light during the past year has allowed a considerable extension of working time.

The large hall on the first floor at the Newbury Street end of the Walker Building, 36½ x 56½ feet in area, which was among those newly assigned to the department, has been utilized in part to contain the physical library, and in part as an apparatus room. A partition has been run across the hall, dividing it into two rooms. That nearest the Rogers Building (36½ x 39½), containing a large number of windows, serves the purpose of a library and study room. It is very commodious, and will contain all the books which the depart-

ment is likely to receive for a long time to come, and will also meet the needs of the students of the department for a study room for several years. Some fear has been felt lest the location of the dynamo room underneath should produce disturbance; but no annoyance appears to have resulted from this cause. The second of the two rooms under consideration (with an area of 17 x 36½ feet), being devoid of window space, has been devoted to the purposes of an apparatus room. It is brilliantly lighted by incandescent electric lamps, so that there is no danger of breakage in moving the appa ratus to and from the cases. To avoid danger from fire, no other illuminant is used in the room.

Upon the second floor, changes and additions of equal magnitude and value have been made. The increased number of students taking second-year physics has necessitated the removal of most of the apparatus cases formerly placed against the inside wall of the physical lecture room (No. 22), in order to allow the introduction of additional seats. It is doubtful whether, even with this enlargement of seating capacity, it will suffice for more than a year or two longer. Room 23, adjoining the physical lecture room, has also been appropriated to the joint use of the departments of chemistry and physics, thus supplying what for the past three years has been one of the most pressing needs of the department, an additional lecture room with blackboard space, capable of seating from seventy to one hundred persons. A space between the temporary partition forming the rear of No. 23 and the rear wall of the Walker Building will probably have to be thrown into this room before long. Meanwhile it can be used for special laboratory work, as needed, chiefly in connection with thesis work.

The department of physics has furthermore been granted the use of the large room, No. 25, formerly occupied by the Architectural Department. This has been divided into several smaller rooms, as follows: A large room, 29½ x 33 feet in area, is set apart as a laboratory of acoustics. This will be devoted especially to advanced work in pure acoustics and telephony. A considerable amount of original research in these directions has already been done here; and it is hoped that, with the additional facilities now offered, this may be still further increased. The room is not yet complete as to

its final arrangements, but will be so in a few weeks. It will be provided with a very steady air-blast of variable pressure from a blower in the basement, for the purpose of sounding organ pipes, sirens, and like instruments, and with electricity both for lighting and for running such motors as are necessary to drive acoustic machinery. The latter will be run on separate circuits from those used for lighting, partly in order that greater steadiness in driving power may be secured, and partly that the alternating current may be used for lighting, if desired, while a direct current is used with the motors. The cabinet of acoustic apparatus will likewise be placed in this room. Experimental telephone lines will place it in communication with several other rooms in the laboratory. From this room at the north end open two smaller rooms, each about 15 x 15 feet. One of these is to be devoted to certain magnetic and electrical researches; the other, to the purposes of a study. A third small room opens from the acoustic laboratory on the side opposite to those first referred to. It occupies a space of 10 x 23 feet, and will contain the apparatus employed in the construction and comparison of resistance-coils. In it will be placed a standard Wheatstone's bridge, a galvanometer, a constant-temperature tank and other needful mechanical and electrical appliances. Between the last-mentioned room and the front of the building is an apartment, 29 x 29½ feet. This will be devoted to advanced work, especially to such optical or other work as requires the use of sunlight. Much of the optical apparatus will also find a place here. The rooms upon the second floor just described will greatly strengthen the Rogers Laboratory in a place where it has hitherto been especially lacking; that is, in the possession of rooms adapted for special as distinct from general work. The need of these has been urgent; and more efficient work may be hoped for than would have been possible without them.

Course VII. Biology. There were graduated from this department, at the close of the last academic year, six students, the largest number hitherto. Three of these were young women who immediately began their professional work by conducting with marked success large vacation classes in natural history at the seashore. In all, upwards of fifty persons were thus taught by them during the summer. Two of them have since secured positions

as teachers in institutions of high grade, and one has become a special assistant in a laboratory. The young men have also readily found positions of usefulness in their chosen profession.

There are now above sixty students of the Institute who spend more or less of their time in the biological laboratory. At the same time, a portion of the biological work of the State Board of Health is done here, and numerous special investigations are under way. Many of the subjects of investigation and instruction are such as to make it exceedingly desirable to have quiet and dust-free laboratories, but at present these must be carried on in the one general laboratory. It is becoming highly important that this department should have a suite of smaller laboratories in which the work upon the organisms of fermentation, putrefaction, and disease can more advantageously be conducted This department has not even a special lecture room of its own, most of its lectures being given in the general laboratory, which is well adapted to the more elementary classes, but inadequate to the needs of those more advanced.

Course IX. General Studies. The increase in the number of students is noticeable.. About thirty students are now engaged in the special work of this course, and with them are some students from technical courses, who desire more of liberal studies than is contained in their prescribed curriculum, and can find the time to come into the classes of Course IX. for extra work. The number of graduates at the last Commencement was seven. Those subjects in this department which are required of the whole school were probably never brought in to such systematic form as they are to-day, and never were so well taught. In addition to the students engaged in the regular work of this department, large numbers of first, second, and third year students from all courses frequent the library and reading-room; and the methods of instruction bring each one of them into educational contact with the contents of the shelves and tables. The librarian's records do not by any means show the full extent of the use which the Institute students make of the Course IX. library; but it is noteworthy that during the scholastic year, 1891–92, there were 4,214 entries in the library register of volumes loaned to students. During the last year two graduate students from Wellesley College profited by the advanced instruction in

economics in the Institute. Two former members of Course IX. now hold fellowships in the School of Political Science in Columbia College, viz., Mr. W. Z. Ripley, of the class of 1891, and Mr. Francis Walker, who graduated with the class of 1892.

The lectures on Business Law, given by Mr. Louis D. Brandeis, of the Suffolk Bar, on each Saturday morning during the school year, constitute a distinct step forward in the history of this department. These lectures have been based upon valuable syllabus work; and are proving of the greatest interest and importance to the students.

Course X. Chemical Engineering. During the past year the course of instruction has not been changed further than by the introduction of a course of lectures given by Mr. Clifford upon photometry. Much, however, has been done in increasing the efficiency and perfecting the methods of instruction in the work given specially in this course. The number of students has continued to increase, rising from 28 in 1891–92 to 34 in 1892–93.

The President would repeat the statement made in the report last year, that a special laboratory, for research and testing work in connection with the course in chemical engineering, must very soon be provided, while it is probable that the number of students who are to graduate from this course in 1894 may make it necessary to provide additional laboratory space for this work during the coming summer. It is interesting to note that a demand has arisen for men trained in chemistry and in mechanical engineering to act as insurance inspectors. Three of the graduates from Course X. have entered upon this employment within a few months; and it is believed that others will be needed in the spring.

Course XII. Geology. It was not possible, on the short notice given, to find any one qualified to supply the place of Mr. Collier Cobb who, as stated, resigned his instructorship with us to accept an assistant professorship in the University of North Carolina. The teaching has consequently been done by others in the department. Additional clerical and mechanical assistance has been given to the teachers in this department, to enable them to carry on the work without loss. There have been no changes in the schedule of the geological course; but the increasing number of students has necessitated a division of some classes. These have

been made in such a way that the work could be further differentiated and thereby better adapted to the needs of students in the several courses which stand related, more or less intimately, to the geological department. The advanced work done by the students in the geological course during their fourth year has made it necessary to have a geological laboratory, and room 14 in the Rogers Building has been used to a considerable extent this year for that purpose. During the school year 1891–92, the names on the class-lists in the geological department amounted to 290.

There have been a goodly number of specimens of fossils added to the paleontological collection. Some work has been done in arranging and identifying the specimens and getting them ready to be catalogued, thereby making them more valuable for instruction. The books of the geological library are chiefly used in the room; but during the year there were 110 volumes borrowed from the library. Five different periodicals are regularly received through purchase or exchange.

Prof. Crosby and Mr. Barton have, during the past year, effected a very thorough revision and rearrangement of the teaching collections in mineralogy and lithology. The specimens are now arranged in permanent lesson-trays, each specimen being placed in a separate compartment and provided with a printed label. Eight identical series of specimens have been provided for the elementary work in mineralogy, and twelve series for the elementary work in lithology. These occupy in all nearly 600 wooden trays. The classes are divided into sections sufficiently small so that in general each student has at each lesson a separate tray of specimens; and it is found on actual trial that, as was anticipated, the new system makes it possible to introduce a much larger proportion of real laboratory work into the instruction, and enables the student to do more thorough work in less time than formerly. The new system has greatly diminished the time and labor of preparation for the lessons. The increased number of classes has made this economy very important.

Considerable additions have been made to the teaching collections in economic geology, the most important being a series of ores contributed by the National Museum. This series embraces

about 800 valuable specimens, and represents a large proportion of the mining districts of this country. Some very desirable illustrations, both of raw materials and manufactured products, have also been contributed without cost to the Institute, by the merchants and manufacturers of Boston and vicinity. Among the desiderata which have been purchased, may be mentioned a series of polished marbles; samples of all the more important tools and materials used in dressing and polishing stones; a complete series of mineral pigments, etc. Valuable additions to the collections have also been obtained by the personal visits of the instructors to mines and quarries.

The guide to the geological collections in the National History Building prepared by Prof. Crosby, having been published during the past year, has been adopted as a text-book in structural geology. Partly for the purpose of more perfectly adapting the guide to this use, but mainly because the charts and diagrams already in use exceed the available wall space on which they can be exhibited, Prof. Crosby has prepared a series of 86 plates, embracing nearly 200 figures, which have been reproduced at the expense of the Institute. These illustrations, which have been culled chiefly from the reports of the government surveys, and are in most cases faithful copies or photographic reproductions of nature, may be regarded as an extension of object teaching beyond the use of specimens or the possibility of field lessons.

During the semi-annual vacation, Prof. Crosby, in company with Mr. H. D. Card, a fourth-year student in economic geology, spent ten days in visiting iron, coal, and other mines, and slate quarries and factories in New Jersey and Eastern Pennsylvania, and also in studying the extensive economic collections in the National Museum at Washington. The summer field work in Mineralogy was done in July, one week being spent by Prof. Crosby and sixteen students in visiting the celebrated localities of Paris, Me, and the adjoining towns. The students became greatly interested in the work, and the session of this summer, though brief, was in every way successful.

COMMONWEALTH OF MASSACHUSETTS.

BOSTON, January 2, 1892.

I certify *the annexed to be a true copy of the opinion of the Supreme Judicial Court in the case of* Massachusetts Agricultural College *v.* Marden, *decided on the 29th day of March, 1892.*

GEO. F. TUCKER,
Reporter of Decisions.

MASSACHUSETTS AGRICULTURAL COLLEGE *v.* GEORGE A. MARDEN.

SUFFOLK. January 15, 18, 1892. — March 29, 1892.

Present: ALLEN, HOLMES, KNOWLTON, MORTON, LATHROP, AND BARKER, JJ.

Act of Congress — Claimants to Fund.

Where the Massachusetts Agricultural College and the Massachusetts Institute of Technology were claimants to a fund paid to the Treasurer and Receiver General, conformably to the provisions of an act of Congress approved August 30, 1890, entitled "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," it was *held* that it was for the Legislature to determine to which of the claimants it would give the fund, or whether it would give a part of it to one and a part to the other; and that the Treasurer and Receiver General had no right to pay out the fund until he was directed so to do by the State.

PETITION for a writ of mandamus to compel the respondent to pay over to the treasurer of the petitioner a fund received by the respondent under the act of Congress approved August 30, 1890. Hearing before *Holmes*, J., who reserved the case for the determination of the full court.

The case was argued at the bar in January, 1892, and afterwards was submitted on the briefs to all the judges except *Field*, C. J.

F. E. Snow (*W. A. Gaston* with him), for the petitioner.

A. L. Lowell, for the respondent.

KNOWLTON, J. By an act of Congress, approved August 30, 1890, entitled "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," it was provided "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 thirty, 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," this appropriation being subject to certain conditions in cases where any distinction is made in the admission of students by reason of race or color.

The second section of the act contains this provision: "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 instalments 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."

By § 4 of said act it was provided "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."

Under this act, a payment of $15,000 for the year ending June 30, 1890, has been made out of the treasury of the United States to the respondent, who is the Treasurer and Receiver General of Massachusetts, and the principal question presented by this petition is what disposition shall be made of the money in his hands.

This first instalment of $15,000 became due before the adjournment of the regular session of the Legislature meeting next after

the passage of the act, and, in reply to a communication from the Secretary of the Interior, the Governor, in behalf of the Commonwealth, assented to the purpose of the grant, as provided in § 2. In answering a series of questions contained in the letter of the Secretary of the Interior, he showed that the petitioner was a college established and maintained in accordance with the act of Congress of July 2, 1862, and it thereby appeared that the State was entitled to have the money paid over to its Treasurer and Receiver General. There was nothing in the reply of the Governor to indicate that there was more than one such college in this Commonwealth.

The Massachusetts Institute of Technology has been made a party to these proceedings, and in its behalf it is now contended that it is an institution which comes within the provisions of the act of July 2, 1862, and that it ought to receive from the respondent a part of this money.

Our first inquiry is whether it is such an institution as is contemplated by the act, and whether the establishment and maintenance of it would entitle the State to receive the money if the Massachusetts Agricultural College were not in existence. By the terms of the act, each of the States was to receive certain public lands, the proceeds of which were to constitute a perpetual fund, "the interest of which shall be inviolably appropriated, by each State which may take and claim the benefit of this act, to the endowment, support, and maintenance of at lease one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the Legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

The Massachusetts Institute of Technology was incorporated by St. of 1861, c. 183, § 1, "for the purpose of instituting and maintaining a society of arts, a museum of arts, and a school of industrial science, and aiding generally, by suitable means, the advancement, development, and practical application of science

in connection with arts, agriculture, manufactures, and commerce." In pursuance of the requirements of the statute, a school of industrial science was afterwards established, and through the school and otherwise the Institute has been carrying out the purpose of its incorporation. All that is required by the act of Congress is that the leading object of the institution shall be to teach "such branches of learning as are related to agriculture and the mechanic arts," "without excluding other scientific and classical studies." Under this statute agriculture is given no preference over the mechanic arts. A proper school of industrial science would be expected to give such instruction as the statute calls for, especially when it aims at "the advancement, development, and practical application of science in connection with arts, agriculture, manufactures, and commerce." Looking at the object of this corporation as defined by its charter, it would seem as if its corporators had anticipated in our State the purpose of Congress, embodied in the statute which we are considering. This seems to have been the view of our legislators of that time; for having by the St. of 1863, c. 166, accepted the grant of Congress, and created "a fund for the promotion of education in agriculture and the mechanic arts," they then, by the St. of 1863, c. 186, granted to the Massachusetts Institute of Technology one third of the income of the fund, and at the same time amended its charter so as to require it to teach military tactics in conformity with the provisions of the act of Congress, and made the Governor, the Chief Justice of the Supreme Judicial Court, and the Secretary of the Board of Education each a member *ex officio* of the government of the Institute. They also required the Institute to furnish to the Governor and Council a copy of the annual report of its operations. The Institute accepted the grant and the amendment to its charter, and established the school of industrial science. Afterwards, in the same year, by the St. of 1863, c. 220, two thirds of the income of the fund was granted to the Massachusetts Agricultural College, which was then incorporated to receive it. Since then, the income of this fund has heen annually divided between the two coporations in the proportion of two thirds to the petitioner and one third to the Massachusetts Institute of Technology. This is

the strongest possible legislative declaration that both of the corporations are within the description of the Act of Congress. If they were not, the appropriation of any part of the income to the Institute of Technology would be a violation of the sacred trust under which the bounty of the general government was received. It is believed that few of the institutions which are receiving the income of funds established under this act are in their organization so near as this is to the very language of the act. They could hardly be nearer without using the precise words of the statute.

The claim of this corporation is not affected by the fact that its charter was granted prior to the passage of the act of Congress. That act contemplates the endowment of colleges already in existence, as well as of those afterwards to be established. All that is required is that the college shall be of the prescribed kind. The grant is to be appropriated "to the endowment, support, and maintenance of at least one college," etc., not necessarily to the establishment of a new college. This point was involved in the decision in *Liggett* v. *Ladd*, 17 Oregon, 89, and in an opinion of the Supreme Court of Rhode Island, holding that Brown University is entitled to receive the benefit of the fund. *In re Agricultural Funds*, Index H H, Dec. Sup. Ct. R. I., Oct. Term, 1890, 159.

Nor can it be held that the fund is necessarily to be for the benefit of only one college in each State. The act of 1862 plainly contemplates the possible existence of more than one college of the kind described in each State. In § 4 the grant is said to be for the endowment "of at least one college." Under § 5, cl. 3, each State is to "provide, within five years, at least not less than one college." The acts of 1866 (39th Cong. 1st Sess. c. 209), of 1872 (42d Cong. 2d Sess. c. 55, 42d Cong. 3d Sess. cc. 2 and 50), and of 1887 (49th Cong. 2d Sess. c. 314), all show that under the act of 1862 there may be two or more colleges in each State entitled to share in the funds.

The act of 1890 provides "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 2, 1862." This includes all such colleges, and there is nothing in it to restrict

the States in the use of the money to one college in each State. They are colleges established "in accordance with" the act, not necessarily under it and subsequent to it. The benefit of the fund is confined to one college for white students only in those States where a separate institution is maintained for colored students, and in those, with a view to an equitable distribution between the two classes, a division is made between one college for white students, and one institution for colored students.

The money in the hands of the Treasurer and Receiver General is the property of the State, held under the law for a particular use and for no other. Whether the State has or has not power to control it in his hands otherwise than to direct the use of it in conformity with the act of Congress, it is clear that neither the State nor the respondent has a legal right to divert it, and that, if there are different ways in which it may be used under the provisions of the statute of the United States, the State alone, acting by its Legislature, can choose between them. *Cornell University* v. *Fiske*, 136 U. S. 152, 203. *People* v. *Davenport*, 117 N. Y. 549. That the Secretary of the Interior, when he drew his warrant for the payment to the respondent, knew of but one college that could properly receive the money is immaterial; for the appropriation by Congress was to the State, and the payment to the respondent was for the use of the State, and the only limitation on the right of the State is to use it for the more complete endowment and maintenance of a college, or of the colleges, established in accordance with the act of 1862. The duty of the Secretary was performed when he determined that the State was entitled to it, and drew his warrant for the payment of it. It should be added that that part of the first section which says that the money shall be "applied only to instruction in agriculture, the mechanic arts," etc., may prevent the use of it in some departments of instruction existing in colleges established in accordance with the act of 1862; for by the terms of the act they are to have a "leading object, . . . without excluding other scientific and classical studies." It is possible that some kinds of classical instruction furnished by some of these colleges cannot be paid for from money received under the act of Aug. 30, 1890. On this point we give no opinion.

The Legislature should determine to which of the two claimants it will give the fund in the hands of the respondent, or whether it will give a part of it to one and a part to the other. The respondent has no right to pay it out until he is directed so to do by the State. In the opinion of a majority of the court, the petition must therefore be dismissed. *Petition dismissed.*

TREASURER'S REPORT.

STATEMENT OF THE TREASURER.

The Treasurer submits the annual statement of the financial affairs of the Institute for the year ending Sept. 30, 1892 : —

The principal unusual expenditure of the year has been that on account of the new building for the Department of Architecture, amounting for the time covered by this report to thirty-four thousand nine hundred and thirty-one dollars and thirty-two cents ($34,931.32).

The principal amounts received from other than the regular sources of income have been twenty-two thousand dollars received under the Act of Congress of Aug. 30, 1890, covering four annual payments, and sixteen thousand two hundred and fifty dollars received from subscriptions constituting part of a fund to be raised to cover the cost of the new building already referred to, and to meet the other pressing needs of the Institute.

There has also been received from Mrs. Wm. B. Rogers the sum of two hundred dollars for the purchase of periodicals.

Bonds of the face value of twenty-eight thousand dollars have during the year matured and been paid. Twenty-five thousand dollars of the above bore interest at eight per cent, two thousand at seven per cent, and one thousand at six per cent. These investments were made at a time when rates of interest were higher than now, and the reinvestment of these funds at the present rates will result in a decreased income for the Institute.

Notes receivable, amounting to twenty-five thousand four hundred and seventy-six dollars and seventy-five cents, have been paid, and the following changes in securities have been made : —

SALE OF SECURITIES, GENERAL FUND.

$ 1,000 Burlington & Missouri River R. R. in Neb. 6s, called	$1,000 00	
$25,000 Quincy & Palmyra R. R. 8s, exchanged	25,250 00	
$22,000 Hannibal & St. Joseph R. R. 6s, sold,	25,685 00	
$ 2,000 Cincinnati & Indiana R. R. 7s, paid	2,000 00	
Chicago, Burlington & Quincy R. R. Rights, sold	115 50	
154 shares Chicago, Burlington & Quincy R. R., sold	16,458 75	
$7,000 Chicago, Burlington & Quincy R. R., 7s, 1903, transferred to Rogers Memorial Fund	8,715 00	
		$79,224 25

SALE OF SECURITIES WM. B. ROGERS MEMORIAL FUND.

$37,000 Chicago Junction & Union Stock Yards, 5s	$35,137 50	
Chicago, Burlington & Quincy R. R. Rights	165 00	
220 Shares Chicago, Burlington & Quincy R. R.	23,512 50	
		$58,815 00

The following securities have been bought: —

PURCHASE OF SECURITIES, GENERAL FUND.

$ 1,000 Burlington & Missouri River R. R. in Neb. 6s, 1918, non-exempt	$1,030 00	
$13,000 New York & New England R. R. First 6s, 1905	14,510 00	
$25,000 Hannibal & St. Joseph R. R. 6s, 1911,	27,500 00	
$25,000 Eastern R. R. of Minnesota 5s, 1908,	25,125 00	
$15,000 Chicago, Burlington & Quincy R. R. Conv. 5s, 1903	16,283 55	
		$84,448 55

PURCHASE OF SECURITIES, WM. B. ROGERS MEMORIAL FUND.

$22,000 Chicago, Burlington & Quincy R. R. Conv. 5s, 1903	$23,882 53	
$35,000 Fort Street Union Depot 4½s, 1941	34,825 00	
		$58,707 53

The income of the Institute for the past year has been divided at the rate of five per cent among the funds to which it belongs.

The net result of the year has been, apart from the cost of the new building, an expenditure over income of three thousand two hundred and sixty-two dollars and twelve cents ($3,262.12), which has been charged against Massachusetts Institute of Technology Account.

GEORGE WIGGLESWORTH, Treasurer, *in account with*

General Statement of Receipts and Disbursements

Dr.

Cash balance Sept. 30, 1891		$9,004 79
From Augustus Lowell for Lowell Courses	$3,900 00	
" " " " C. Kastner's salary	2,500 00	
" " " " Lowell School of Design	1,333 33	
		7,733 33
Receipts for Current Expenses.		
Income of funds for salaries	$4,380 00	
" " " " scholarships (students' fees)	3,665 00	
" " " " Joy "	200 00	
" " " " Swett "	400 00	
" " " " Library	250 00	
" " " " general purposes	10,389 12	
" " Rogers Memorial Fund	12,511 25	
Students' fees	185,873 77	
State Agricultural Fund	5,712 93	
State Endowment Fund, 4 years	22,000 00	
Laboratory breakage and supplies	4,422 99	
Rents, per Table (page 78)	7,115 50	
Gifts	200 00	
Interest	2,328 77	
Pope Fund for Highway Engineering	1,200 00	
" " used from balance of 1891	66 11	
Boston University	1,150 00	
Sale printed Lecture Notes	2,339 95	
Society of Arts	80 39	
Profit and Loss, expenses more than income (see per contra)	3,262 12	
		267,547 90
Bequests, New Trusts, Etc.		
Letter Box Fund, received	$126 70	
Income James Savage Fund, not used	573 62	
" James H. Mirrlees Fund, " "	12 36	
" William Barton Rogers Fund, " "	22 27	
" Elisha Thacher Loring Fund, " "	24 57	
" Richard Perkins Fund, " "	320 26	
" Charlotte Billings Richardson Fund, " "	1,541 25	
" Charles Lewis Flint Fund, " "	56 87	
" Joy Fund, " "	396 20	
		3,074 10
Sale of Securities, General Fund.		
See list as per page 69.		79,224 25
Sale of Securities, Wm. B. Rogers Memorial Fund.		
See list as per page 69.		58,815 00
Sundries.		
Notes Receivable paid	$25,476 75	
Subscription of 1892	16,250 00	
Net gain on sales of Bonds and Stocks, 1883 to 1892	4,951 17	
New boiler account charged to expense	5,000 00	
Income General Funds credited to Advance Bond Premium Account, $453.24 and $44.72	497 96	
Income Wm. B. Rogers Memorial Fund credited to Advance Bond Premium Account, $249.23 and $186.97	436 20	
Balance Account Lowell School of Design, 1883 to 1892, charged to General Expense	720 66	
		53,332 74
		$478,732 11

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

FOR THE YEAR ENDING SEPTEMBER 30, 1892.

Cr.

Paid for Lowell Courses	$3,900 00	
" " Charles Kastner's salary	2,500 00	
" " Expense Lowell School of Design	1,592 02	
		$7,992 02

EXPENSES.

Salaries, per Table (page 78)	$179,767 94	
" paid from the Pope Fund	900 00	
Supplies " " " " "	366 11	
Scholarships paid from Swett Fund	200 00	
" " " Rogers Fund	90 00	
Repairs, per Table (page 78)	8,500 83	
General Expense, per Table (page 79)	12,233 94	
Boiler No. 2, Balance Account	5,000 00	
Fuel	8,766 61	
Water	1,485 00	
Gas	2,011 10	
Printing and Advertising	3,242 86	
" Lecture Notes	2,522 23	
" Annual Catalogue	1,934 09	
Rents paid Boston & Albany R. R. Co.	180 00	
" " Natural History Society	400 00	
Laboratory Supplies and Libraries, per Table (page 78)	29,523 24	
Interest, 5 per cent on funds not in stocks and bonds	9,423 95	
Interest paid A. Lowell, Trustee	1,000 00	
		267,547 90

INVESTMENTS, ETC.

SECURITIES, GENERAL ACCOUNT.

$ 1,000	Burlington & Missouri River R. R., Neb., 6s, non-exempt	$1,030 00	
25,000	Hannibal & St. Joseph R. R., 6s	27,500 00	
25,000	Eastern R. R., of Minnesota, 5s	25,125 00	
15,000	Chicago, Burlington & Quincy R. R., Conv. 5s	16,283 55	
13,000	New York & New England R. R., First 6s	14,510 00	
	Joy Scholarship Fund deposited	396 20	
			84,844 75

SECURITIES BOUGHT FOR WM. B. ROGERS MEMORIAL FUND.

$ 250	Kansas City, Memphis & Birmingham R. R., Coupon Note	$250 00	
22,000	Chicago, Burlington & Quincy R. R., Conv. 5s	23,882 53	
35,000	Fort Street Union Depot 4 1-2s	34,825 00	
7,000	Chicago, Burlington & Quincy R. R., 7s, 1903, transferred from General Securities	8,715 00	
			67,672 53

SUNDRIES.

Gymnasium Building Addition	$2,402 24	
Students' Notes Receivable	5 00	
Students' Deposits paid	50 00	
Pope Fund, used from balance of 1891	66 11	
Net gain on Sales of Bonds and Stocks, 1883 to 1892	4,951 17	
Architects' Building	34,931 32	
Profit and Loss, per contra	3,262 12	
		45,667 96
Cash Balance, Sept. 30, 1892		5,006 95
		$478,732 11

The following account exhibits the property held by the Institute, as per Treasurer's books, Sept. 30, 1892: —

INVESTMENT OF THE W. B. ROGERS MEMORIAL FUND.

$50,000 00	Saginaw & Western R. R. 6s	1913	$50,000 00	
30,000 00	Burlington & Mo. River R. R., 4s	1910	25,787 50	
25,000 00	Kansas City Belt R. R. 6s	1916	25,000 00	
20,000 00	Mo. Valley Blair Ry. & Bridge Co. 6s	1923	20,000 00	
18,000 00	Atchison, Topeka & Santa Fé R. R. 4s	1989	15,372 30	
16,000 00	Kansas City, Clinton & Springfield R. R. 5s	1925	16,000 00	
7,000 00	Omaha & Southwestern R. R. 8s	1896	7,000 00	
5,400 00	Republican Valley R. R. 6s	1919	5,400 00	
4,000 00	Cin., Ind., St. Louis & Chicago R. R. 6s	1920	4,000 00	
2,000 00	Ottawa, Oswego & Fox River R. R. 8s	1900	2,000 00	
2,000 00	New York & New England R. R. First 6s	1905	2,000 00	
2,000 00	Kansas City, Fort Scott & Gulf R. R. 7s	1908	2,000 00	
2,000 00	Kansas City, Memphis & Birmingham R. R. 5s	1927	1,905 00	
250 00	" " " Coupon Note	1901	250 00	
1,000 00	Lincoln & Northwestern R. R. 7s	1910	1,000 00	
1,000 00	Atchison & Nebraska R. R. 7s	1908	1,000 00	
7,000 00	Chicago, Burlington & Quincy R. R. 7s	1903	7,000 00	
22,000 00	" " " Conv. 5s	1903	22,000 00	
35,000 00	Fort Street Union Depot 4½s	1941	34,825 00	
	Advances to Bond Premium account		7,533 91	
	Bonds			$250,073 71

INVESTMENT OF THE JOY SCHOLARSHIP FUND.

Massachusetts Hospital Life Insurance Co.	$5,000 00	
Deposits in Savings Banks	3,555 83	
		8,555 83

INVESTMENT SWETT SCHOLARSHIP FUND.

Massachusetts Hospital Life Insurance Co.	10,000 00

INVESTMENT OF OTHER TRUSTS.

$50,000 00	Atchison, Topeka & Santa Fé R. R. 6s	1893	$50,000 00	
18,000 00	Bur. & Mo. River (Neb.) R. R. 6s, non-exempt,	1918	18,000 00	
15,000 00	" " (Land Grant) R. R. 7s	1893	15,000 00	
6,000 00	Chicago, Burlington & Quincy R. R. 4s	1922	5,100 00	
3,000 00	Milwaukee & St. Paul R. R. 7 3-10	1898	3,000 00	
2,000 00	Chicago, Burlington & Northern R. R. 5s	1926	2,000 00	
2,000 00	Kansas City, Fort Scott & Gulf R. R. 7s	1908	2,000 00	
1,000 00	International & Great Northern R. R. 6s	1919	1,000 00	
1,000 00	Union Pacific R. R. 6s	1898	1,000 00	
13,000 00	New York & New England R. R. First 6s	1905	13,000 00	
3,000 00	Hannibal & St. Joseph R. R. 6s	1911	3,000 00	
25,000 00	Eastern R. R. of Minnesota 5s	1908	25,000 00	
15,000 00	Chicago, Burlington & Quincy R. R. Conv. 5s	1903	15,000 00	
	Advances to Bond Premium account		2,183 19	
	Bonds			155,283 19
	Amount carried up			$423,912 73

Amount brought up			$423,912 73

STOCKS.

SHARES.				
148	Boston & Albany R. R.,	par 100	$29,933 00	
12	Cocheco Manufacturing Co.,	" 500	6,000 00	
55	Old Boston National Bank,	" 100	5,510 50	
50	Hamilton Woollen Co.,	" 100	5,000 00	
82	Morris & Essex R. R.,	" 50	6,150 00	
27	Essex Co.,	" 50	4,050 00	
75	Pennsylvania Coal Co.,	" 50	11,250 00	
35	Everett Mills,	" 100	3,150 00	
40	New York & Harlem R. R.,	" 50	5,000 00	
20	Pittsburg, Fort Wayne & C. R. R.,	" 100	3,000 00	
15	Consolidated Gas Co., New York,	" 100	1,447 50	
				80,491 00

REAL ESTATE.

Rogers Building		$315,726 88	
Walker Building		190,492 44	
Land on Garrison Street	$50,840 00		
Workshops " "	52,416 49		
		103,256 49	
Land on Trinity Place	$76,315 69		
Engineering B'ld'g, Trinity Place	106,616 87		
		182,932 56	
Gymnasium Building		7,742 85	
Architects' Building		34,931 32	
			835,082 54
Equipment, Engineering Building		$16,555 24	
" Workshops		20,628 56	
			37,183 80

SUNDRIES.

Notes Receivable		$1,500 00	
Students' Notes		2,405 00	
Cash Balance, Sept. 30, 1892		5,006 95	
			8,911 95
			$1,385,582 02

The foregoing Property represents the following Funds and Balances and is answerable for the same.

The Income of the following is used for the general purposes of the Institute:—

William Barton Rogers Memorial Fund	$250,225 00	
Richard Perkins Fund	50,000 00	
George Bucknam Dorr Fund	49,573 47	
Martha Ann Edwards "	30,000 00	
Nathaniel C. Nash "	10,000 00	
Sidney Bartlett "	10,000 00	
Robert E. Rogers "	7,680 77	
Albion K. P. Welch "	5,000 00	
Stanton Blake "	5,000 00	
McGregor "	2,500 00	
General Institute "	36,028 00	
		$456,007 24

The Income of the following is used towards paying salaries:—

Nathaniel Thayer, for Professorship of Physics,	$25,000 00	
Jas. Hayward, for Professorship of Engineering,	18,800 00	
William P. Mason, " Geology	18,800 00	
Henry B. Rogers, for General Salaries	25,000 00	
		87,600 00

SCHOLARSHIP TRUSTS.

Richard Perkins Fund	$52,575 46	
James Savage Fund	12,045 96	
Mrs. Susan H. Swett Fund	10,182 95	
William Barton Rogers Fund	8,857 78	
Joy Fund	8,555 83	
Elisha Thacher Loring Fund	5,266 09	
Charles Lewis Flint Fund	5,194 22	
Thomas Sherwin Fund	5,000 00	
Farnsworth Fund	5,000 00	
James H. Mirrlees Fund	2,659 63	
		115,337 92

OTHER TRUSTS.

Charlotte Billings Richardson, Industrial Chemistry Fund,	32,366 25
Charles Lewis Flint, Library Fund	5,000 00
Albert A. Pope, Street Building and Highway Engineering, Fund, balance	715 01
Letter Box Fund, balance	209 37

MISCELLANEOUS.

Notes Payable	$20,000 00	
Students' Deposits	400 00	
Subscription of 1887	123,500 00	
Subscription of 1892	16,250 00	
M. I. T. Stock Account	528,196 23	
		688,346 23
		$1,385,582 02

Comparative Statement of Funds, etc.

	Sept. 30, 1891.	Sept. 30, 1892.
Trusts for general purposes	$456,007 24	$456,007 24
" " Salaries	87,600 00	87,600 00
" " Scholarships	113,931 77	115,337 92
" " Library	5,000 00	5,000 00
Charlotte Billings Richardson Industrial Chemistry Fund	30,825 00	32,366 25
Albert A. Pope Street Building and Highway Engineering Fund	781 12	715 01
Letter Box Fund	82 67	209 37
Notes Payable	20,000 00	20,000 00
Students' Deposits	450 00	400 00
Subscription of 1887	123,500 00	123,500 00
" " 1892		16,250 00
M. I. T. Stock Account	526,507 18	528,196 23
	$1,364,684 98	$1,385,582 02
Increase	20,897 04	
Consisting of:—		
Charlotte Billings Richardson Fund Income	$1,541 25	
Scholarship Funds, not used	1,406 15	
Letter Box Fund, increase	126 70	
Subscription of 1892	16,250 00	
Net Gain on Sales of Bonds and Stocks, 1883 to 1892	4,951 17	
		$24,275 27
Less Loss. Expenses more than Income	$3,262 12	
Less on A. A. Pope Fund	66 11	
" " Students' Deposits	50 00	
		3,378 23
		$20,897 04

INCOME FROM GENERAL INVESTMENTS, AND APPLICATION THEREOF.

Applied to	Salaries	$4,380 00	
"	" Scholarships	3,665 00	
"	" Library	250 00	
"	" General Purposes	10,389 12	
"	" Increase of Funds	2,551 20	
"	" Advances to Bond Premiums	453 24	
		$21,688 56	
From	Dividends, Old Boston National Bank		$330 00
"	State Tax returned, Old Boston National Bank		78 89
"	Railroad Bonds		8,347 97
"	Dividends, Pittsburg, Ft. W. & C. R. R. Stock		140 00
"	Dividends, Pennsylvania Coal Co.		600 00
"	" Everett Mills		210 00
"	" Essex Co.		162 00
"	" Cocheco Mfg. Co.		240 00
"	" Consolidated Gas Co., N.Y.		105 00
"	" Chicago, Bur. & Q. R. R.		365 75
"	" New York & Harlem R. R.		210 00
"	" Hamilton Woollen Mills		300 00
"	" Morris & Essex R. R.		287 00
"	" Boston & Albany R. R.		888 00
"	Interest on Funds not in Bonds and Stocks @ 5%, being the rate of earnings of the other invested funds		9,423 95
			$21,688 56

INCOME FROM WILLIAM BARTON ROGERS MEMORIAL FUND, AND APPLICATION THEREOF.

Paid Massachusetts Institute of Technology 5%		Received Income from Railroad Bonds .	$12,237 98
on Amount of Fund ($250,225.00) .	$12,511 25	" Dividend 220 Shares Chicago,	
Credited to Advances Bond Premiums .	249 23	Burlington & Quincy R. R. .	522 50
	$12,760 48		$12,760 48

DETAILS OF SOME ITEMS IN TREASURER'S CASH ACCOUNT.

Rents.

Huntington Hall, for Lowell Lectures	$3,200 00	
Lowell School of Design	1,800 00	
Chauncy Hall School, for Gymnasium	500 00	
State Board of Health, for use of Laboratories	900 00	
Boston Water Works, use of Laboratory	300 00	
Use of Lecture Rooms and Gymnasium	415 50	
		$7,115 50

Department Supplies.

Chemical Department	$7,722 25	
Physical "	5,005 37	
Mining "	1,549 03	
Mechanical Eng'r'g "	2,874 15	
Applied Mechanics "	1,223 41	
Civil Engineering "	2,865 79	
Biological "	1,730 32	
Geological "	870 06	
Architectural "	1,408 62	
Drawing "	51 59	
Mathematical "	10 27	
English "	1,185 36	
Workshops	1,604 80	
Modern Languages	218 91	
Periodicals	1,203 31	
		$29,523 24

Salaries.

Instruction	$147,373 05	
Administration	16,746 64	
Labor	15,648 25	
		$179,767 94

Repairs.

Department Improvements: —		
Chemical Department	$1,454 12	
Physical "	692 39	
Workshops "	431 79	
Mechanical Eng'r'g "	423 01	
Civil " "	186 99	
Amount carried forward	$3,188 30	

Amount brought forward	$3,188 30		
Architectural Department	114 96		
Mining "	106 91		
Modern Language "	103 49		
English "	83 03		
Biological "	50 80		
Geological "	38 14		
Mathematical "	32 00		
Drawing "	9 28		
		$3,726 91	
Rogers Building (alterations, etc.)		869 08	
Gymnasium "		791 41	
Walker Building "		779 69	
Replumbing Toilet Rooms, Eng'r'g B'ld'g		430 66	
Steam Fitting		362 00	
Engineering Building		312 27	
Pointing, etc., Engineering Building		188 95	
President's, Secretary's and Bursar's Offices		116 70	
Boiler Room		71 95	
Lunch Room		51 33	
Sundries		799 88	
			$8,500 83

General Expenses.

Electric Lighting: —			
Power Furnished	$169 49		
Wiring, etc.	338 28		
		$507 77	
Engine Room Supplies: —			
Oil	$236 10		
Cotton Waste	53 19		
Sundries	70 67	359 96	
Fire Insurance		2,354 91	
Stationery and Office Supplies		1,248 33	
Postage		876 00	
Technology Quarterly, Contribution to Publication and Printing		807 78	
Entrance Examinations		731 92	
Lowell School of Design, 1883–92		720 66	
Diplomas, Commissions, and Expense of Drills		558 29	
Legal Fees		525 00	
Washing		396 80	
Examination Books		377 50	
Express Charges, Teaming, etc.		374 95	
Amount carried forward		$9,839 87	

Amount brought forward	$9,839 87	
Janitor's Supplies: —		
Brushes, Pails, Dusters, Soap, etc.	309 76	
Paints, Varnish, etc.	249 17	
Drafting on Buildings, Testing, etc.	247 70	
Books and Supplies for General Library	235 32	
Ice	175 64	
Window Shades	173 75	
Blackboards	145 50	
Towelling	134 10	
Furniture	115 37	
Window Glass	111 56	
Exhibit, State Medical Society	104 69	
Union Safe Deposit Vaults, rent, 2 years	100 00	
Safe, Bursar's Office	100 00	
Gymnasium Supplies	97 81	
Telephone and Telegraph Charges	60 70	
Boston Electric Time Co.	33 00	
		$12,233 94

BOSTON, Dec. 5, 1892.

An examination of the accounts of the Treasurer of the Massachusetts Institute of Technology for the year ending Sept. 30, 1892, has been made, and they are found to be correctly cast, and with proper vouchers. The ledger balances agree with the trial balance. We have verified the evidences of personal property held by the Institute.

FREDERIC W. LINCOLN,
CHARLES C. JACKSON,
JAMES P. TOLMAN,
Auditing Committee.