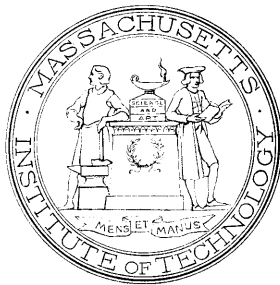


ANNUAL REPORT
OF THE
PRESIDENT AND TREASURER
OF THE
MASSACHUSETTS
INSTITUTE OF TECHNOLOGY,

DEC. 9, 1891.



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To the Corporation of the Massachusetts Institute of Technology: —

It is my pleasant duty to report another year of fortunate progress at the Institute of Technology. Things have, on the whole, gone wonderfully well with us. The reputation of the school is steadily extending outwards; the spirit of the school is steadily rising within. Each succeeding year, as our work increases in amount, we have the satisfaction of feeling that it is better done. The increase in our numbers has not been more marked than has been the improvement in the quality of the instruction given at the Institute.

One event to grieve us deeply has occurred since our last annual meeting in the death of our esteemed and beloved colleague, Hon. Samuel C. Cobb. His devotion to the Institute was sincere and earnest. He was one of our most attentive and diligent members throughout his long term of service upon the Corporation; and it pleased him at his death to remember the Institute in the distribution of his worldly estate.

The retirement of Mr. Tappan from the secretaryship of the Corporation, in consequence of delicate health, is regretted by us all. Mr. Tappan has, by many years of faithful service in the offices of Bursar, Secretary and Treasurer, acquired an intimate knowledge of the school, — its history, organization, traditions, methods, — such, perhaps, as is possessed by no other member of the Corporation. Fortunately he remains with us, though reluctantly relinquishing the positions of special responsibility

which he has held so much to the advantage of the Institute.

Of the 102 graduating members of the class of 1891, 17 graduated in civil engineering, 26 in mechanical engineering, 4 in mining engineering, 6 in architecture, 11 in chemistry, 23 in electrical engineering, 3 in biology, 3 in physics; 1 graduated from the department of general studies, 7 in chemical engineering and 1 in geology. All courses of the school, except Course XI., sanitary engineering, which was only instituted in 1889, were thus represented in the award of diplomas. The fourth-year students of the year now current comprise candidates for the degree of the Institute in each of the twelve courses here carried on. At the coming Commencement, Course XI. will present several candidates for the degree.

The new year has witnessed another large increase in the number of students in the school. The total registration, this year, as by the catalogue now in press, amounts to 1,011 against 937 last year, a gain of 74. 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		

STUDENTS BY CLASSES.

The aggregate number of students for 1890-91 is divided among the several classes as follows :—

Graduate students, candidates for advanced degrees	2
Regular students, Fourth Year	146
“ “ Third Year	140
“ “ Second Year	155
“ “ First Year	263
Special students	305
Total	1,011

This table shows the number of regular students of the fourth year to hold a larger ratio to the total number of students in the school than ever before. The ratio this year is 14.5 per cent against 11.2 last year.

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	2		2
Fourth Year	146	29	175
Third Year	140	92	232
Second Year	155	129	284
First Year	263	55	318
Total	706	305	1,011

STATISTICS OF EXAMINATIONS.

Of the 1,011 students of the present year, 387 were not connected with the school in 1890-91.

Fifteen had been connected with the Institute at some previous time, and returned to resume their places in the

school; 38 were admitted provisionally, without examination; 9 were admitted by examination to the second year; 37 were admitted on the presentation of diplomas or certificates from other institutions.

Excluding from consideration those who were admitted but have not, in fact, entered the school, 53 in number, the following was the result of the examinations held:—

Admitted clear	87	•
“ on one condition	87	
“ “ two conditions	51	
“ “ three “	32	
“ “ more than three conditions	8	265
Rejected		<u>53</u>
		318

EXAMINATIONS AT DISTANT POINTS.

In addition to the entrance examinations held in Boston in June and September, 1891, examinations were also conducted, in June, at Chicago, Cincinnati, Montreal, New York, Philadelphia, Pittsburg, Portland, Oreg., San Francisco, St. Louis, St. Paul, and Washington.

RESIDENCE OF STUDENTS.

Thirty-eight States of the Union, besides the District of Columbia and New Mexico, are represented on our list of students. Of the total number of 1,011, including special students, 565 are from Massachusetts, or 55.88 per cent of the whole; 102 are from other New England States; 334 from outside New England, of whom 38 are from foreign countries.

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

State.	Candidates for Advanced Degree.						All Regular Students.	Special Students.	Total.	State.	Candidates for Advanced Degree.						All Regular Students.	Special Students.	Total.
	Fourth Year.	Third Year.	Second Year.	First Year.							Fourth Year.	Third Year.	Second Year.	First Year.					
Alabama.....				1	1	1	2		Tennessee.....							4	4		
Arkansas.....	1	1			2	1	3		Texas.....						2	2	5		
California.....	4	1	3	4	12	7	19		Vermont.....				1	2	2	2	6		
Colorado.....	1	1	2	4	3	7	7		Virginia.....	2	1			3	3	3	3		
Connecticut.....	6	4	3	5	18	12	30		Washington.....	1			1	2	1	3	2		
Dist. Columbia.....				1	3	1	4		West Virginia.....		1			1	1	2	7		
Florida.....	1	1		1	3		3		Wisconsin.....	2		1	2	5	2				
Georgia.....	1				1	1	2		<i>Foreign Countries.</i>										
Idaho.....						1	1		Brazil.....				3	4		4			
Illinois.....	7	6	5	4	22	10	32		Bulgaria.....		1			1		1			
Indiana.....				1	1	2	3		Cent'l America.....			1		1		1			
Iowa.....		1	1	3	5	5	10		Colombia.....				1	1		1			
Kansas.....						2	2		England.....							1			
Kentucky.....	1	1	2	3	7	1	8		France.....							2	4		
Louisiana.....		2	2	1	3	2	5		Hawaiian Isl'ds.....				2	2		2			
Maine.....	2	6	2	11	21	6	27		Holland.....				1	2		2			
Maryland.....	2	2		3	5	2	7		Japan.....		1			1		1			
Massachusetts.....	288	83	89	157	419	146	565		Mexico.....					1	2		2		
Michigan.....	1	3		3	7	6	13		N. Brunswick.....	1						1			
Minnesota.....	1	3	4	2	10	3	13		New So. Wales.....							1			
Missouri.....	1	2	1	2	6	6	12		Nova Scotia.....							1			
Nebraska.....				1	1		1		Peru.....							1			
Nevada.....		1	2	3		3	3		Porto Rico.....							1			
N. Hampshire.....	1	5	5	5	16	8	24		Prov. Ontario.....			1	1	2		2			
New Jersey.....	3	3	1	3	10	6	16		Prov. Quebec.....			2	1	3		1	4		
New Mexico.....				1	1		1		Scotland.....	1						1			
New York.....	3	4	7	12	26	14	40		Trinidad.....							2			
No. Carolina.....	1				1		1		Turkey.....		2					2			
Ohio.....	6	5	3	6	20	13	33		Venezuela.....					1		1			
Oregon.....					1	1	1		Total.....	2	146	140	155	263	706	305	1011		
Pennsylvania.....	4	3	6	7	20	6	26												
Rhode Island.....	2	4	4	7	17	9	26												
So. Carolina.....			1		1	3	4												

When it is considered how many scientific and technical schools have been founded during the past three or four years, and how many colleges and universities have established scientific and technical departments during the same period, it is gratifying to note the firmness with which this Massachusetts school has maintained its hold upon its wide geographical constituency. For this we have largely to thank our alumni, whose high standard of professional conduct, not less, even, than their scientific attainments or their devoted loyalty to their *alma mater*,

has done much to promote the reputation of the Institute in distant States.

A table showing the number of students in each year from and including 1885, coming from each state or territory and from each foreign country, may not be without interest and instruction:—

	1885.	1886.	1887.	1888.	1889.	1890.	1891.		1885.	1886.	1887.	1888.	1889.	1890.	1891.
<i>States.</i>								<i>States.</i>							
Alabama	2				1		2	Washington			1		2	2	3
Arkansas			3	2	2	3	3	West Virginia		1			2	2	2
California	5	8	9	13	10	14	19	Wisconsin	1	3	5	7	9	10	7
Colorado			2	2	6	4	7	Wyoming Terr.				1			
Connecticut	16	16	29	28	36	31	30								
Delaware	1	1					1	<i>Foreign Coun'ts.</i>							
Dist. of Columbia, ..	4	4	4	9	9	7	4	Argentine Rep.						2	
Florida					2	3	3	Belgium	1						
Georgia	2	3	2	1	1	2	2	Brazil		1	2	2	2	4	
Idaho Territory								Bulgaria				1	1	1	
Illinois	20	19	29	37	33	34	32	Central America ..							1
Indiana	1	2		1	3	6	3	Chili							
Iowa	6	6	3	6	4	9	10	Colombia					1		2
Kansas	2	2						Cuba	1						
Kentucky	5	4	2	3	4	4	8	England						2	1
Louisiana	1	2	2	4	4	7	7	France							
Maine	22	20	24	26	30	29	27	Greece					1		
Maryland	1	2	2	4	4	7	7	Guatemala		1	1	1			
Massachusetts	387	402	429	494	533	517	505	Guiana							
Michigan	3	5	10	12	13	16	13	Hawaiian Islands, ..				1	1	4	4
Minnesota	5	4	6	8	10	12	13	Holland							2
Mississippi	1	1						India							
Missouri	2	1	5	7	8	8	12	Ireland			1	1	1	1	
Montana					1	1	1	Japan	1	1	1	1	1	1	3
Nebraska	3	2	4	2	1	1	1	Mexico						1	1
Nevada	1	1						New Brunswick	3	1			1	1	1
New Hampshire	22	26	19	24	21	23	24	New South Wales, ..							1
New Jersey	5	7	11	8	13	11	16	Nova Scotia					2	2	1
New Mexico				2				Peru	2	1	2	1	3	1	
New York	17	24	35	31	25	40	40	Porto Rico		1	2	2	2	1	
North Carolina	1				2	1	1	Province Ontario ..			1	2	1	1	2
Ohio	18	21	21	23	35	33	33	Province Quebec. ..	3	3	2	1	1	4	4
Oregon	1	1		1	2	1	1	Scotland	2			1	1	3	2
Pennsylvania	15	13	18	18	23	22	26	Trinidad			1	1	1	1	1
Rhode Island	12	17	19	22	22	21	26	Turkey		1	1	2	1	2	
South Carolina	2	1	1		1			Venezuela							1
South Dakota															
Tennessee	2	1	2	3	5	3	4								
Texas		1	2				2								
Vermont	6	5	7	5	4	4	5								
Virginia	5	3	5	4	6	5	6								
Total	609	637	720	827	909	937	1011								

RESIDENCE OF MASSACHUSETTS STUDENTS.

It has been said that 55.88 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 ten 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 sends us 190 pupils; Middlesex comes next, with 169; Norfolk third, with 67; Essex fourth, with 58. Last year Middlesex County led the list.

COUNTY.	No. of Towns.	No. of Students.	COUNTY.	No. of Towns.	No. of Students.
Barnstable . . .	2	3	Hampshire . . .	1	1
Berkshire . . .	2	3	Middlesex . . .	30	169
Bristol . . .	5	13	Norfolk . . .	20	67
Essex . . .	16	58	Plymouth . . .	13	28
Franklin . . .	1	2	Suffolk . . .	4	190
Hampden . . .	4	12	Worcester . . .	12	19
	30	91	Total . . .	110	565

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

Boston	176	Framingham	8	Belmont	4
Newton	28	Lowell	8	Dedham	4
Cambridge	20	Springfield	8	Fall River	4
Brookline	17	Wellesley	8	Fitchburg	4
Somerville	14	Salem	7	Hingham	4
Waltham	14	Arlington	6	Kingston	4
Lynn	13	Lawrence	6	Needham	4
Malden	12	Medford	6	Reading	4
Chelsea	11	Melrose	5	Rockland	4
Newburyport	10	Woburn	5	Taunton	4
Hyde Park	9	Abington	4	Watertown	4

PROPORTION OF OLD AND OF 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 Cata- logue 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 num- ber are reg- ular 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

It appears from the foregoing that the number of students remaining over has been increased by 52, while the number registered for the first time is larger by 22, making the total gain, as previously stated, 74.

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 263. From these we should except 12 cases of students of unusual ages. These deductions leave 251 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 1890-91:—

* In addition, 5 students are repeating the first year.

PERIOD OF LIFE.	1890-91.		1891-92.	
	Half-Year Groups.	Yearly Groups.	Half-Year Groups.	Yearly Groups.
16 to 16½ years	1	..	..	..
16½ to 17 years	10	11	4	4
17 to 17½ years	11	..	26	..
17½ to 18 years	32	43	39	65
18 to 18½ years	48	..	41	..
18½ to 19 years	53	101	50	91
19 to 19½ years	38	..	35	..
19½ to 20 years	24	62	21	56
20 to 20½ years	10	..	18	..
20½ to 21 years	9	19	8	26
21 to 22 years	10	10	9	9
	246	246	251	251

From the foregoing tables it appears that the average age of the 251 students taken for this comparison, the present year, is 18 years and 9 months.

In this connection it may be interesting to note the ages at graduation of the class leaving us in June. The 102 members of the class were distributed among the several periods of life, as follows:—

Under 20	1	Between 22 and 23	23
Between 20 and 20½	3	“ 23 and 24	14
“ 20½ and 21	11	24 and over	15
“ 21 and 21½	13		—
“ 21½ and 22	22		102

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

WOMEN AS STUDENTS IN THE INSTITUTE.

The number of women pursuing courses with us is 26. Of this number, 5 are graduates of colleges. Of the total number, 4 are regular students of the fourth year; 1 of the third year; 4 of the second year. Seventeen are special students. Of the 9 regular students of the upper classes, 1 takes Course IV., architecture; 1 Course V., chemistry; 4 Course VII., natural history; 2 Course VIII., physics; 1 Course XII., geology. Of the special students, 3 devote themselves to architecture, 4 to chemistry, 4 to physics; 2 chiefly to biology and allied subjects; and 2 to political science. Two are reported as special students on account of their deficiencies in French, who are, in all other particulars, taking the full course in the first year.

GRADUATES OF OTHER COLLEGES.

Fifty graduates of institutions conferring degrees are included in our list of students for the present year. Of these, 8 are our own graduates, of whom 2 are pursuing studies as candidates for advanced degrees. Forty-two are graduates of other institutions pursuing courses of study with us, either as regular or as special students. Of

these, 10 are graduates of Harvard University, 5 of Amherst College, 2 each of Brown University, St. John's College, Smith College, and Allegheny College, while one comes from each of the following institutions: Yale University, Brown University, University of Michigan, Middlebury College, Wellesley College, University of Alabama, Central University, Cornell University, Vanderbilt University, National Deaf Mute College, Ogden College, University of the South, Bowdoin College, University of Virginia, Kansas State Agricultural College, Robert College, Trinity College, University of the City of New York, and State University of Iowa.

Of the 48, not candidates for advanced degrees here, 12 are regular students of the fourth year, — 2 in civil engineering, 1 in mechanical engineering, 1 in architecture, 8 in electrical engineering; 6 are regular students in the third year, — 3 in civil engineering, 1 in mining engineering, 2 in electrical engineering; 2 are regular students in the second year, — 1 in civil engineering, and 1 in architecture; 2 are regular students in the first year; the remaining 26 are special students.

The increase in the number of our own graduates returning, either to take full additional courses or to perfect themselves in some special department of knowledge, is gratifying. It is much to be desired that this number should increase until it comes to include no inconsiderable part of the graduates of the preceding year. Mr. J. A. Meyer, Jr., of the last class in architecture, and Mr. Clement March, of the last class in civil engineering, have returned as candidates for higher degrees. Messrs. H. A. Fiske, and H. C. Forbes, of the last class in chemical engineering, and Mr. F. E. Norton, of the last class in mechanical engineering, have returned to take an additional year of study, as candidates for the bachelor's degree in electrical engineering. Miss Maltby, of 1890, now teaching physics at Wellesley College, is taking

advanced studies in physics with Professors Cross and Holman. Mr. E. H. Brownell, of 1890, has returned to take advanced studies in civil engineering. Mr. H. B. Roberts, of 1890, is still continuing his studies here.

THE COURSES OF INSTRUCTION.

The following table presents the number of students in each of the regular courses. It will be seen that this statement relates to the second, third, and fourth years only, choice of courses being made at the end of the first year : —

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	30	6	15	6	38	6	1	7	4	5	1	146
3d " " . . .	29	31	7	6	7	42	1	..	8	7	..	2	140
2d " " . . .	25	43	4	12	10	28	4	4	4	17	4	..	155
Total	81	104	17	33	23	108	11	5	19	28	9	3	441

The following table shows the figures of the total line in the foregoing table, in comparison with the corresponding figures for the seven next 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	8	..	..	..	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	..	407
1891	81	104	17	33	23	108	11	5	19	28	9	3	441

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.	Geology.	Total.
1868	6	1	6	..	..	..	..	..	..	1	..	..	14
1869	2	2	..	..	1	..	..	..	..	..	..	..	5
1870	4	2	2	..	1	..	..	..	..	1	..	..	10
1871	8	2	2	..	2	..	..	..	..	..	..	..	17
1872	3	1	5	..	3	..	..	..	..	..	..	..	12
1873	12	2	3	1	7	..	..	..	..	1	..	..	26
1874	10	4	1	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	3	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	5	3	13	..	18	3	2	6	..	..	102
1891	17	26	4	6	11	..	23	3	3	1	7	1	102
Total,	200	215	119	41	120	1	95	17	14	31	7	1	861
Deduct names counted twice													2
Net total													859

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.

Acoustics	16	Heating and Ventilation	49
Applied Mechanics	63	History	65
Architecture	74	Hydraulics	12
Biology	8	Industrial Chemistry	7
Business Law	42	Italian	3
Chemistry	87	Mathematics	165
Civil Engineering	7	Mechanics	48
Climatology	1	Metallurgy	20
Descriptive Geometry	108	Military Drill	17
Design	44	Mining Engineering	2
Drawing	81	Organic Chemistry	10
Dynamics of Machines	5	Physics	135
Dynamo Testing	4	Physiology	1
Electrical Engineering	21	Political Economy	30
Elementary French	50	Political Science	7
English	98	Railroad Engineering	12
Engineering Laboratory	4	Shopwork	95
Freehand Drawing	50	Steam Engineering	5
French	37	Surveying	29
Geodesy	2	Thermodynamics	30
Geology	36	Zoölogy	5
German	100		

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, which are as follows : —

STUDIES.	First Year.	Second Year.	Third Year.	Fourth Year.	Total.
Mathematics	320	216	158	44	738
Chemistry	321	65	37	26	449
English	296	197	123	61	677
French	213	87	40	24	364
Physics . . . . .	...	244	178	57	479
German	66	171	127	13	377
Shop-work	21	133	49	44	247

FIVE-YEAR COURSES.

I have given the distribution of the aggregate body of students among the four classes recognized in the catalogue of the school. As a matter of fact, however, this classification has to be somewhat qualified, with reference to the existence of a class of students who are taking five-year courses in the Institute.

In the catalogue of 1878-9, it was stated that "students who find it advantageous to take fewer studies in any one year than are prescribed, may continue in the school a fifth year, to make up the studies required for a degree." This statement, or its equivalent, was repeated in each successive catalogue until that of 1885-6, in which the scheme received a further expansion through the important statement that students duly enrolling themselves to take their courses in five years, would be regarded, not as special, but as regular students. Concurrently with this issue of the catalogue, a circular was distributed to the students, and to their parents or guardians, commending the plan of a five-year course to those "who, from considerations of health, lack of thorough preparation or other cause, have reason to anticipate exceptional difficulty in carrying on all the studies of the regular four-year courses." The circular closed with the following significant remark: "Altogether irrespective of any difficulties, encountered or anticipated, in completing any one of the regular courses within the term of four years, a *five-year course may also be made the means of affording students a larger amount of field-work and laboratory-practice than can be provided for in the present courses.* This may particularly be the case with students who desire to unite some specialty with their regular training." In the same connection it was stated that a committee of the Faculty had been appointed to confer with students contemplating a five-year course, and to have the general oversight of those pursuing such

courses. That committee has been continued to the present time under the chairmanship of Prof. Otis, and subsequently of Prof. Holman.

The plan of five-year courses has steadily grown in favor with students whose financial means made the prolonging of their studies a matter of free choice. Last year the president published an article in the students' magazine, "The Tech," calling attention to the opportunities afforded by the five-year courses for pursuing additional studies in modern languages and in history, political economy and statistics, and dwelling upon the great advantages, alike for mental cultivation and for professional success, to be derived from such studies. At the outset, considerable difficulty was experienced in framing timetables which would allow the studies of the regular courses to be distributed among the five years without requiring a costly duplication of recitations, lectures, laboratory exercises, etc.; but these obstacles have all been surmounted; and there is now no department which does not offer to all students desiring it the advantages of this arrangement.

The following table shows the number of five-year students by courses, and by years. As there are none in V., VII., VIII., and XII., these courses do not appear in the table:—

YEAR.	Total.	COURSE.							Course Undetermined.
		I.	II.	IV.	VI.	IX.	X.	XI.	
First	8	1	2	1	..	..	..	..	4
Second	12	1	8	..	1	..	1	1	..
Third.	14	..	3	5	5	..	1	..	..
Fourth.	4	1	2	..	..	1	..	..	..
Fifth	3	..	2	..	1	..	..	..	..
	41	3	17	6	7	1	2	1	4

CHANGES IN BUILDINGS AND ROOMS.

No new buildings have been erected during the year now closing. The building which serves as our gymnasium and drill-hall, on Exeter Street, was, during the summer, enlarged by an addition, 25 x 50 feet, devoted to baths, lockers and offices. The bathing and toilet facilities of the gymnasium are now of the first-class, while the clear floor-space, for drill and gymnastic exercises, has been considerably increased. The voluntary use of the gymnasium by the students has apparently doubled during the past year, in recognition of which the Executive Committee have engaged the services of a competent instructor to give those who attend the gymnasium the benefit of his advice and skilled assistance. The students have expressed much gratification at the improved facilities for exercise and athletic training afforded them; and I feel sure the results will be thoroughly wholesome and good.

In the Rogers Building, considerable changes have been effected in the Biological Laboratory by the erection of interior partitions; while on the fourth floor, the large room, No. 44, has been cut into two recitation rooms, to meet the demands arising from the larger number of sections in mathematics and the languages. In the Walker Building, the large laboratories, Nos. 10 and 16, on the first floor, are now being equipped with electric lights, in view of the desire of the students in physics to continue their experiments to a later hour in the afternoon. In the basement of this building an additional laboratory, 29 x 37 feet, has been set apart for the electrical department; while on the third floor, a part of No. 36 has been cut off for the work in gas analysis. No changes have been made in the structure of the Engineering Building, which, I may say, is by every day's use more and more clearly

demonstrating the wisdom alike of its general plan and of its minor arrangements.

The large increase in the number of students has caused an overflow from our previously crowded buildings; and it has been found necessary to hire one of the rooms of the Natural History Building, on the same square with us. We greatly need several additional rooms for the use of instructors, for consultation rooms and administrative offices.

LIBRARIES.

The total accessions to the libraries have been 5,191; of which 2,737 have been received as gifts or in exchange, 2,002 obtained by purchase, and 452 by binding periodicals and pamphlets. The net accessions have been 4,963, of which 4,080 are volumes and 883 pamphlets. The distribution and cost, including binding of the accessions, and the total number of *volumes* in each library, are shown in the following table:—

LIBRARY.	Vols. added.	Pph's added.	Cost.	Total No. of vols.
General	467	257	\$437 14	2,285
Engineering	637	88	1,067 49	2,750*
Mining	119	20	192 03	1,016
Architectural	67	1	188 33	800*
Chemical	431	135	506 44	4,662
Biological	194	68	155 41	1,133
Physical	568	39	495 34	2,990
Political Science	963	253	718 05	4,395
English	386	3	411 91	1,057
Geological	212	19	48 86	1,200*
Margaret Cheney Room	36	..	.....	500*
Total	4,080	883	\$4,221 00	22,788

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

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

The total number of periodicals received, excluding annuals, is 338; of these 215 are subscribed for at a cost of \$1,143.31, and 123 are received as gifts or in exchange. The number of duplicate copies received is 15, and the number of separate periodicals received 329.

The employment of an assistant has enabled the librarian to undertake the supervision of the binding and some other work which had been previously left to the departments. The change probably has secured greater economy of time and money, and certainly has sensibly relieved the professors and instructors. During the year 613 binding orders were given, covering 905 volumes, at a cost of \$936.38. It has been possible, also, to send with each book a copy of its catalogue card, thus keeping the departmental card catalogues up to date in the easiest and surest way.

During the year, 5,638 cards have been added to the main catalogue, which now contains 16,920 cards, covering 18,682 volumes and 3,560 pamphlets. During the summer the cataloguing of the General library was finished, and the Physical library was catalogued. Work on the other libraries was prevented by the receipt of the Rogers library. The librarian has also aided the assistant in the Political Science library in the arrangement of the books on the shelves, and has superintended the preparation of a shelf-list for the Engineering library. The total amount, spent on the libraries, exclusive of salaries, has been \$5,515.73.

The principal gift of the year is the very valuable library of the late President William B. Rogers, received from Mrs. Rogers, in addition to the portion of the library received three years ago. The number of volumes received in July was 1,268, of which 1,030 were placed on the shelves, distributed as follows: General Library, 259; Engineering,

51; Mining 15; Architectural, 5; Chemical, 90; Physical, 228; Biological, 117; Political Science, 78; English, 5; Geological, 147; Margaret Cheney Room, 35. Besides these volumes many valuable maps and several hundred pamphlets were received.

Other gifts are as follows:—

From the President of the Institute, 187 volumes and pamphlets, mostly on political economy.

From T. J. Borden, Esq., a set of M. Alcan's works on the textile industries.

From the M. I. T. Civil Engineering Society, a copy of the Century Dictionary.

From Hon. John Costigan, Minister of Inland Revenue, Canada, a complete set of the publications of his office. A large number of books relating to roads and highways have been purchased during the year for the Engineering library, with a portion of the fund contributed by Colonel Albert A. Pope.

THE CORPS OF INSTRUCTORS.

The catalogue of 1891-92 shows the number of instructors of all grades to be 102, 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 120, made up as follows:—

Professors	12
Associate Professors	13
Assistant Professors	8
Instructors	42
Assistants	27
Lecturers for the year	18
	<hr/>
	120

	Civil Engineering.	Mechanical Eng. and App. Mechanics.	Mining Engineering and Metallurgy.	Architecture.	Chemistry.	Physics and Elect. Engineering.	Biology, Zoology, etc.	Mineralogy, Geology, and Geography.	English, History and Political Science.	Language.	Mathematics.	Drawing and Descriptive Geometry.	Mechanic Arts.	Military Tactics.
Professors .....(12)	1	1	1	2	1	1	1	1	..	1	2	..	..	..
Associate Professors(13)	3	2	1	..	1	1	..	..	3	1	1	..	..	..
Assistant Professors (8)	..	2	..	1	1	..	..	1	..	1	1	1	..	..
Instructors .....(42)	3	5	1	1	8	5	1	2	3	2	5	2	3	1
Assistants .....(27)	3	7	..	..	6	3	2	..	..	..	..	3	3	..
Total.....(102)	10	17	3	4	17	10	4	4	6	5	9	6	6	1
Lecturers.....(18)	1	..	1	5	4	4	2	..	1	..	..	..	..	..
Total .....(120)	11	17	4	9	21	14	6	4	7	5	9	6	6	1

These tables show that, with 1,011 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 chiefly in the nature of promotions among the existing staff. The list above shows a net increase of seven teachers over that appearing in the last report.

Those invaluable officers, Associate Professors Holman and Schwamb, have returned from their year's absence, much improved in health, and have resumed work with their classes. Associate Professor Létang has, in recognition of twenty years of brilliant service, been appointed Professor of Architectural Design. The growing usefulness of the Department of Biology has justified the promotion of Associate Professor Sedgwick to be Professor. Assistant Professor Hofman has been promoted to be Associate Professor of Metallurgy. Two new appointments to the faculty of the school have been made. Dr. Dippold becomes Assistant Professor of Modern Languages; Mr. A. L. Merrill, Assistant Professor of Mechanism. Dr. Dippold has been instructor in the Institute since 1886. Mr. Merrill graduated from the school in the class of 1885; remained as assistant in the Mechanical Engineering department the two succeeding years, and was appointed instructor in 1887.

Mr. Emery, of the English department, having gone abroad to pursue his studies, Mr. Henry Nash Dickinson, A. B., of the class of 1890, at Amherst College, was appointed to his place.

The English department is now earnestly and intelligently at work upon the problem, how to give the best possible instruction in composition and in literature to the pupils of a scientific and technical school, who are necessarily pressed for time by the urgent demands of their professional studies. On the importance, at once, and the difficulty of this problem, I commented at length in my last report. (pp. 23-26.) Professor Carpenter and his assistants are doing their best to achieve a satisfactory result. The courses in English for all regular students have undergone a marked development during the past year. The relation between first-year and second-year English has been more clearly defined, to the advantage of both courses. An experiment, foreshadowed in my last report,

has been tried, on a moderate scale, by which the current work of the students of Courses III. and IX. upon professional subjects, has been submitted to Professor Carpenter for criticism. So far, the experiment appears to have been successful. Should further trial prove this course to be practicable, it will go far towards solving the problem referred to. The English library has been strengthened during the year, and has become better adapted to the needs of both the regular and the special students.

The courses in History and Political Economy prescribed for all regular students are given by Professors Levermore and Dewey, with constantly increasing effect. Nothing in the early times of the Institute exhibits more strongly the wisdom which controlled its organization and its general scheme of study than the definitive assignment of a certain, necessarily not a large, space to these studies. In spite of the urgent, the painfully urgent, demand coming up at all times from the professional courses, for more time in which to deal with the constantly increasing matter of interest to them, the faculty have stood firmly by the policy adopted at the beginning; and the allowance of time to English, history, and political economy remains unchanged. Especially is this a subject of satisfaction, now that so many students are resorting to us quite as much for the education and discipline they are to receive as for professional accomplishments. When, in July, I addressed the Convocation of the University of New York, at Albany, on the place of scientific and technical schools in the American system of education, and, after accounting as well as I might for their rapid rise and growth, advanced the proposition that these schools have not only successfully performed their primary work of fitting men to promote and superintend the development of the material resources of the United States, but that they have come, in the course of their own gradual development, to be institutions of a very high order of importance, from the

strictly educational point of view, giving a kind and degree of mental training of the greatest value, and turning out a product of educated men not surpassed by the classical colleges, I was met by several of the most distinguished educators of the country with this reply : " We fully agree with what you have said regarding the highly educational value of the scientific work done in these schools ; we admit that study in the natural and physical sciences has many advantages, for the creation of mind and manhood, over the older studies of philosophy, linguistics and dialectics ; we agree, too, that the technical applications of science in the schools you represent serve to heighten the interest and quicken the zeal of the student, without sordidly debasing his motives in acquiring knowledge. But we cannot but hold that the entire neglect of philosophical studies by the schools of science and technology is neither *eral* in spirit nor beneficial in its results." Glad I was to tell them that, in the institution with which I had the honor to be connected, such studies had from the first been incorporated in the curriculum as an integral and necessary part ; and that no student had ever yet been graduated from the Massachusetts Institute of Technology, who had not taken substantial courses in literature, history and political science.

In the mathematical department there were two vacancies to be filled at the opening of the school year, in September, due to the retirement of Messrs. Frizell and Woods. It was, however, determined by the Executive Committee to make three appointments, with a view to diminishing the size of the sections in mathematics, a result long desired. The gentlemen appointed for these positions were Mr. Frederick H. Bailey, A. M., of the class of 1887, at Harvard University ; Mr. Frank M. Greenlaw, S. B., of the class of 1890, at the Institute, and Mr. Nathan R. George, Jr., A. B., of the class of 1890, at Harvard University.

Since the school opened, however, another vacancy in

the actually instructing staff in this department has occurred, owing to the appointment of Dr. H. W. Tyler, as Secretary, to succeed Mr. Henck, on the latter's resignation. Dr. Tyler still retains his place in the faculty; while his classes for the current term have been taken by his colleagues, in addition to their previous duties. Some other arrangement, not yet consummated, will be made in season for the work of the second term.

It has also been felt to be desirable to reduce the size of the modern language sections; and with a view to this, it was determined by the Executive Committee to appoint an additional instructor in that department for the current year. To this position Mr. Otto Heller was appointed and is now so engaged. Mr. Heller, a native of Austria, was educated in the schools of Prague and Brück, and in the Universities of Prague and Vienna. Coming to the United States in 1883, he taught in the Amsterdam Academy, N. Y., and in private schools in Philadelphia, until appointed Instructor here. He has published a *First Course in German* (Phil., 1887), edited Stifter's *Haidedorf*; and, in conjunction with Prof. H. A. Clarke, made a metrical translation of Ernst von Wildenbruch's *Harold*.

While the appointment of Mr. Heller has afforded some relief in the matter of the size of the classes in modern languages, those classes are still too large for the best effect; and I hope means will be found, another year, for still another instructor in this department. The work in history and political science devolving upon Professor Levermore having increased beyond his power of carrying it alone, Mr. Chas. F. A. Currier was appointed Instructor in this department. Mr. Currier graduated from Harvard University in 1887, and in 1888 received the degree of A. M. from that institution. After further study at Harvard, chiefly in constructional history, Mr. Currier spent a year at Berlin with Professors Gneist, Brummer, and others, and then a year at Paris in the *École Libre des Sciences Politiques*.

With a view to promoting the study of Highway Engineering, Mr. Fred. E. Foss has been appointed Instructor in the department of civil engineering, on the Pope foundation, and assigned to road making and repairing as a specialty. Mr. Foss graduated from Bates College in 1883, and received the degree of A. M., from the same college, in 1886. He graduated in Civil Engineering from the Institute of Technology with the class of 1886. From 1886 to 1889 he was employed as resident engineer and as assistant engineer of maintenance of way, on the Chicago, St. Paul & Kansas City Railway, having charge of construction work of various kinds, including the Galena tunnel. From November, 1889, till the summer of 1891, he was engaged as resident engineer on the Chicago Union Pacific Railway, in charge of construction of yards at Chicago.

The following named gentlemen, assistants last year, have been promoted to be Instructors: George W. Hamblet, in Mechanical Engineering; Frank A. Laws, in Physics.

The list of assistants for the current year is as follows: in Civil Engineering: Franklin Knight, Nathan R. Pratt, Luis F. Verges. In Mechanical Engineering and Applied Mechanics: John O. DeWolf, Howard C. Slater, Fred A. Cole, Carleton A. Read, James Swan, Clifford M. Tyler, Charles P. Wetherbee. In Chemistry: Edward C. Holton, William S. Davenport, Willis R. Whitney, Horace Burrough, Jr., Ernest A. Hersam, Oscar W. Pickering. In Physics and Electrical Engineering: Harry M. Goodwin, William L. Smith, Arthur N. Mansfield. In Biology: George V. McLauthlin, Franklin W. White. In Drawing and Descriptive Geometry: Harrison I. Cole, Walter E. Hopton, Hamilton Rice. In the Mechanic Arts: James D. Littlefield, Wesley B. Churchill, Charles L. Conant.

SUMMER SCHOOLS.

Summer School of Geodesy and Topography.— This school was conducted by Professors Burton, Porter, Niles, and Crosby and Mr. Robbins, at Delaware Water Gap, during the month of June. The topographical and geodetic work consisted of the survey of an area of about one square mile along the Delaware River, and the measurement of a base line over one-half mile long, with triangulations from the base-line to the surrounding hills. The base-line was measured by apparatus designed by students of the school, involving some new and interesting features. The results proved remarkably satisfactory. The hydraulic work of the school comprised about a dozen measurements of the flow of the Delaware River, at two different places, with floats and meters. The geological work consisted in a study of the geology of the surrounding country in its relation to the topographical features, and the construction of an accurate geological section about two miles long. Excursions were also made to the steel works at Bethlehem, to Mauch Chunk, and the engineering features of interest in that vicinity, and to the Bangor slate quarries. The school was attended by sixteen students, and was in every respect successful and satisfactory.

Summer School of Metallurgy.— This year the school was held in New Jersey and Pennsylvania. The instructors present were Professors Richards and Hofman. Most of the time was passed at Pittsburgh, where the students spent nearly a month in studying the various processes of the iron and steel manufacture. Opportunities for metallurgical study, such as occur at Pittsburgh, are hardly to be found at any other point in the world; and the eager scholars from the Institute made the most of them. At all the following named works our party were cordially received and were granted every facility:—

The Orford Copper Company, The Bethlehem Iron

Company, The Lucy Furnaces, The Isabella Furnaces, The Eliza Furnaces, Schoenberger Speer & Co., The Upper Union Mills, The Crescent Steel Company, The Vesuvius Iron and Nail Works, The Pennsylvania Lead Company, The American Iron and Steel Works, The Homestead Steel Works, The Standard Mines of H. C. Frick Coke Company, The Edgar Thompson Steel Works and Blast Furnaces, The Oliver Iron and Steel Company, The Latrobe Steel Works, The Fort Pitt Foundry, The Pittsburgh Reduction Company, The Carbon Iron Company, and the Union Storage Company.

Course I. *Civil Engineering.* — The course of study in this department has not been altered in any important respect during the past year. The staff of professors and instructors is the same as heretofore, with the addition of Mr. Fred. E. Foss, who was this year appointed Instructor in highway engineering. The development of the work of instruction in this branch is progressing as rapidly as possible; and the class-room work will be considerably extended this year. Special lectures on this branch were given last spring by Mr. E. P. North of New York, and Mr. H. T. Buttolph of Buffalo; and it is expected that similar lectures by specialists will be given from time to time.

The equipment of the hydraulic laboratory has been increased during the past year by several important pieces of apparatus: one, permitting of the delicate measurement of the velocity in any part of a flowing jet, as well as the measurement of the size of the jet; another, serving for carrying on experiments upon the flow through short tubes or mouth-pieces, with measurements of the pressure at the throat. Designs are in progress for several other instruments which will be added this year. As all the apparatus is original, and has to be specially constructed, great care is taken to design the instruments so that they can be used for as great a variety of purposes as possible, and also, that all possible contingencies which

can arise in their use may be adequately provided for. Among apparatus which has been presented or loaned to the laboratory should be mentioned a Pelton water motor, presented by the company, and a variety of apparatus loaned by Mr. John R. Freeman, which he used in his recent extended experiments on the discharge through nozzles and fire-hose. The laboratory continues to be the subject of frequent inquiries from engineers and from other schools of science.

The work in surveying and geodesy remains essentially the same as heretofore, but some laboratory work in connection with it is being introduced. Room 44, in the Engineering Building, will, this year, be fitted up as a laboratory for experiments on the coefficients of expansion of the actual tapes used in measuring base lines, the accurate examination of bubble tubes, the collimation of telescopes, and the accurate adjustment of instruments generally. The outfit of instruments has been increased this year by a fine reflecting circle.

Course II. *Mechanical Engineering.*— Besides the constant and gradual development that takes place from year to year, the following are matters that should be specially mentioned, regarding this department of the school. In my last report attention was called to the need, in the Engineering Laboratories, of an Emery testing machine, of 200,000 or, better still, 300,000 pounds capacity. I have now to report that this need will shortly be supplied, a horizontal machine of this kind, of 300,000 pounds capacity, having been contracted for, at a cost of \$12,660. The machine is to be constructed by William Sellers & Co., of Philadelphia, and contains all the essential principles of the famous 800,000 pounds testing machine, at the Watertown Arsenal, which was built by Albert H. Emery. Since the time of the building of the Government machine, the Yale & Towne Manufacturing Company, of Stamford, Conn., has made a few vertical machines of this type, having a

capacity of 150,000 pounds. At the present time, the firm of William Sellers & Co., of Philadelphia, are undertaking their manufacture; and, while they have built one or two of 100,000 pounds capacity, this is the first which they have undertaken of a capacity so great as 300,000 pounds.

The extreme delicacy and accuracy of this type of machine is generally recognized. This delicacy and accuracy of working, together with the fact that the machine under construction is to have a capacity of 300,000 pounds, and will be suitable for testing a compression specimen eighteen feet long, and a tension specimen twelve feet long, will enable the department of applied mechanics to undertake and carry out a kind and amount of experimental investigation which it could not otherwise perform, and to obtain a large number of results of value in practical engineering work, of a kind that could not possibly be obtained by means of machines of smaller capacity. The machine is to be placed on the north side of the basement room of the laboratory for testing the strength of materials, the machinery now occupying this portion of the room being transferred to other parts of the laboratory. Owing to the fact that the floor of the laboratory is exceptionally strong, the machine will be set directly on the floor, and will require no special foundation. It is expected to be in place in season for the second term's work.

In last year's report attention was called to the fact that a considerable increase had been made in the time devoted to instruction in Naval Architecture. I have now to report that the course has already been developed to such an extent that, during the present school year, the time devoted to it is two and one-third times as much as last year; and it is intended again to increase the time very considerably for the next school year. Professor Peabody, who is in charge of this work, has this year assigned to him, Mr. Charles P. Wetherbee, a graduate of the class of 1891, as assistant for this special purpose. The course has

been carried forward so far that it now includes, not only a more extended treatment, than heretofore, of the theory of the stability of vessels, together with a study of methods of construction, but, also, applications made to the case of a government ship of good design. The assignment of a suitable assistant has made it possible to work up a considerable amount of material, and to put it in a form which will be permanently useful for purposes of instruction ; so that next year an extended course will be offered in the Theory of Naval Architecture with proper drawings and calculations, in a manner similar to that given in the government schools of England and France. The department is now in possession of drawings, lines of ships, displacement-sheets, and other material necessary for carrying on the work ; but the future development of the subject will require a very large addition to this material. It is also very desirable that there shall be provided a set of models, showing the framing and construction of iron and steel ships, together with sections of the angle irons, z-irons, beams, etc., and examples of the various joints and methods of riveting. The possession, at some future time, of an experimental tank, say, thirty feet wide, ten feet deep, and three hundred to four hundred feet long, with the various towing and dynamometrical apparatus, profiling machines for making models of ships from their lines, and other appurtenances, would enable this school to introduce laboratory methods into this work, and to obtain results of practical value to the profession.

The present affords an appropriate occasion to remark that there is always a gradual and constant development going on in this, as in other, departments of the Institute, which, while it does not conspicuously appear on a comparison of one year with the next, is seen very strikingly in a comparison of longer periods. Improvements which singly attract little attention are accumulated until they amount to most important gains ; gains so great that a

student of three or four years ago would, on comparing the course as at present given with that which he took, be surprised at the improvement, especially in the later years of the course. And this improvement has taken place with no greater demand than formerly upon the time and strength of the student. That such an advance could be effected simply shows how much science there may be in teaching science. Thus, if we compare the Mechanical Engineering Course, as given at present with that given a few years ago, we find :

(1.) That it has been found possible to transfer considerable of the work on valve-gears from the lecture-room to the drawing-room ; and this fact, together with the time gained by a better systemization of the course in thermodynamics and steam, has rendered it possible to insert, in the third-year course on Steam, — (a) more work on the construction of engines ; (b) work on compound and multiple engines ; (c) work on steam-injectors and steam-pumps, part of which was formerly given in the fourth year course on steam and part in the marine option ; also to insert a study of the gas engine in the fourth-year course.

(2.) That, considerable as is the amount of data on the strength of materials used in construction, obtained by means of experiments on a practical scale in different parts of the world during the last few years, the department of applied mechanics has been constantly developing its class-room exercises close up with this advance, which causes the work done at present in the fourth-year applied mechanics to be far superior to that done a few years ago.

(3.) That the work done in all of the three options has been very much developed and rendered more practical, so that a student who took any one of them a few years ago would find the greater part of the present work new and in advance of that done when he was here. All three options of the fourth year in mechanical engineering are taken by students. Thus, we have in the class of 1892,

fifteen taking the Mill option ; five, the Locomotive option ; nine, the Marine option, of whom six are taking, also, the course in Naval Architecture.

While a considerable amount of experimental investigation is constantly being carried on in the laboratories, it may be worth while specially to mention a series of careful and elaborate tests made upon the new triple-expansion engine, the results of which were communicated to the American Society of Mechanical Engineers, in June, 1891, by Professor Peabody. By way of smaller additions to the apparatus of the laboratories, which have not yet been noted in the report, may be mentioned a machine for testing the effect of repeated bending on the strength and elasticity of iron and steel, by means of which Professor Sondericker has been enabled to carry on a considerable amount of research into this matter ; also, a machine for testing the strength of cloth. Another addition to the Mechanical Engineering Laboratory is found in a duplex pump, presented by the New York Air Brake Company.

Professor Schwamb will give, this year, to the students of the fourth-year class, some instruction in shop management ; and it is intended within a short time to develop this feature of the instruction very considerably. I am indebted to Henry R. Towne, Esq., of Stamford, Conn., for valuable suggestions regarding the manner in which such a course should be organized and conducted.

I have already referred to the resignation of Instructor Purinton, the promotion of Instructor Merrill to be Assistant Professor of Mechanism, and the welcome return of Associate Professor Schwamb after his year's absence. To Professor Merrill has been assigned all the work in mechanism and cotton machinery, except that done personally by Professor Schwamb. Instructor Miller has been relieved from the drawing-room work and placed in charge of the engineering laboratory ; while Mr. G. W. Hamblet, promoted from Assistant to Instructor, has taken up the

drawing-room work left by Mr. Miller. The present organization of the mechanical engineering department is strong and efficient.

Course III. *Mining Engineering and Metallurgy.*— The preparation of lithographic notes upon the professional subjects is progressing. This year the course in ore-dressing will be mainly, if not wholly, drawn up in lithographic notes. In the John Cummings Laboratories important additions have been made to the apparatus, namely, — a Brückner revolving roasting furnace, a pair of Collin jigs, and three new muffle assaying furnaces. The first of these was a gift to the department; and the second was furnished at an extremely low price by the Chicago Iron Works. Both were specially designed and constructed for the mining department, and contain some features which, from alike the educational and commercial point of view, are new and valuable. The additional apparatus adds greatly to the facilities of the laboratory for the most efficient tests of ores by the most modern appliances. The new muffle-furnaces render the assaying more efficient, as well as much more comfortable for class work. A course on technical machinery is now being given by Professor Peabody, in the second term of the fourth year, to the mining engineering students.

Course IV. *Architecture.*— The growing success of this, always first-rank, department constitutes one of the most striking features of the Institute. In spite of illness continued through the greater part of last year, Professor Chandler, with his able corps of assistants, succeeded in keeping up the interest and the practical progress of his pupils to a remarkable degree; and the present year has opened with the largest number of students which the architectural department has ever known, notwithstanding the discontinuance of the two-year Partial Course, which it was anticipated would cause an immediate falling-off in attendance. The raising of the standard of admission for

special students has resulted in attracting a large class of older men, of considerable office experience. This has perceptibly added to the power of the department. A circular will shortly be issued which will further explain, for the information of intending special students, the conditions upon which they may enter this course, and will give advice as to the studies they should pursue in preparation for it. A greater number of students than ever before are taking the five-year course, in architecture. The opportunity of securing additional instruction and practice in design, sketching, and water color, and of becoming intimately acquainted with the department library, is proving a strong incentive to the students to protract their stay at the Institute.

The library of the department is a first-rate working library; and its current additions are made with much care, to meet practical and everyday needs. Mrs. William B. Rogers has given four large and beautiful Roman photographs which have been framed and hung upon the walls. The Technology Architectural Society has presented to the library Smith's Dictionary of Greek and Roman Antiquities; also, a German and a French Dictionary. The construction of diagrams and charts, for use in the various courses of lectures, has been continued on the most liberal scale. These are of a permanent character, relating particularly to construction-details, architectural history, graphical statics, orders, shades and shadows. The Executive Committee have arranged to have an accomplished draughtsman kept steadily at work, month after month, until the whole series shall be completed, when it will form an addition to the resources of the department whose value can scarcely be estimated. More than almost any other department of the school, this is already suffering from confined space, notwithstanding the two great drawing-rooms three years ago placed at its disposal. Every desk is taken, and the facilities in the

way of lecture rooms and of rooms for the storing and exhibition of models and the materials of construction, are altogether inadequate. Even the library-room is too small for the superb collections of books and photographs now belonging to the department. During Professor Chandler's illness, many of his classes were successfully conducted by Mr. W. A. Rodman, of this city.

Course V. Chemistry. — The general state of the chemical work of the school is satisfactory. Ever since the assignment of Prof. Drown to the charge of the entire chemical department, there has been progress in each branch of the service, while a better relation has been established between the different parts. The most noticeable changes of the year have been as follows :—

Associate Professor Norton, who has hitherto given the instruction in both organic and industrial chemistry, was, at his own desire, at the close of the past year, relieved of the organic work. This relief to Professor Norton came none too early. The growth in both the departments under his charge during the few preceding years had been so great as nearly to crush him; and I feel almost guilty for allowing him to carry such a burden for so long a time. No definitive arrangements regarding the instruction in organic chemistry have yet been made; but for the present year we have been so fortunate as to secure the services of Professor Henry B. Hill, of Harvard University, who is now giving the instruction to the fourth-year class.

During the past year, the laboratory of industrial chemistry has been completely rearranged, and its capability for work largely increased by the introduction of additional evaporating apparatus and other facilities. A separate machine-room has been provided, and the machinery has all been set therein. The work in textile coloring has undergone further development during the past year; and a two-color printing machine, presented to the Institute through the liberality of the Pacific Mills Corporation, will

soon be in operation. The facilities for teaching gas analysis have been increased both by the purchase of new apparatus and by the enlargement of the room devoted to this purpose. In addition to the instruction given to the chemists in this important branch of analysis, it is now possible to offer to the students in the engineering courses instruction and practice in the analysis of furnace gases. In the department of sanitary chemistry, the analysis of the waters of Massachusetts for the State Board of Health is still carried on, as is also the analytical work connected with experiments on water filtration now being conducted by the city of Boston.

Courses VI. and VIII. *Physics and Electrical Engineering.* — In the department of physics and electrical engineering there has been, as in previous years, a continued progress in the amount and character of the work done. The increased number of assistants, at the service of the physical department during the past and present year, has enabled it to increase very materially the value of the instruction in the physical laboratory, owing to the closer supervision of individual students and to the certainty that the apparatus would be at all times in condition to give good results. With the welcome return of Professor Holman the new course of lectures and laboratory exercises in heat measurements, arranged for previously to his departure a year ago, has begun, thus filling an important gap in the instruction given to the students in chemical engineering and allied courses. With the advance in the grade of instruction in theoretical electricity given in the third year to the students in Courses VI. and VIII., it has come to be impossible longer to give the same instruction to students in Course V., as well, since these do not have the necessary mathematical preparation. A separate class following a different course has, therefore, been organized to meet their needs. Mr. F. A. Laws, instructor in physics, has taken charge of this class.

A very important change has also been made in Course VIII. in the substitution of analytical mechanics for applied mechanics. This change is one which has been desired for many years; but not until now has it been possible to carry it out, owing to the excessive demands made by the more purely professional courses upon the time of the department of mechanics. The new course is in charge of Professor Lanza. This change necessitates an earlier introduction of the subject of differential equations, which has likewise been arranged. Separate instruction in thermodynamics has also been provided for the students in Course VIII. by Professor Peabody. Owing to the inability of Messrs. Jacques and Blake to continue their respective courses on telephone engineering and electro-motors, Messrs. Hammond V. Hayes, Ph. D., and J. P. B. Fiske, S. B., have been appointed lecturers for the current year on those subjects. It is hoped that we may secure a considerable lengthening of these important courses of lectures.

The outfit of the physical laboratory has been very materially increased by the addition of several dynamo-machines and electro-motors, together with much new apparatus for electrical testing. The department has also been able to make use of the large dynamo machine in the engineering laboratory for purposes of instruction in testing, through the co-operation of the department of mechanical engineering.

The difficulties which were alluded to in last year's report, arising from the jarring of the Walker building, are no less serious than heretofore, although there has been no increase. A great convenience has been added to the laboratory during the past year by its connection with the mains of the Edison Electric Illuminating Company. Although the current furnished from them is not sufficiently steady for use in delicate testing, it enables us to carry on work of certain kinds in the evening, or during vacation, without the necessity of running our own dynamos and

large engine. It may also offer a partial solution of the trouble from occasional overloading of our dynamos and engine on dark days, when there is a great demand for electricity for general lighting in addition to that used in laboratory operations. The most serious difficulties that we have to contend with arise from the very large number of students taking the full course in electrical engineering in the fourth year. The increase from twenty-seven students in 1890-91 to forty-one in 1891-92, is severely taxing our resources, especially as concerns suitable rooms and sufficient material for thesis and other advanced work. The department would find itself seriously embarrassed were it not for the cheerful help afforded by the students themselves in surmounting the various obstacles that arise, and the patience exercised by them in cases where unavoidable delay is experienced. Should our present number of students continue, a very considerably increased amount of room, apparatus, and machinery will be essential to further increase in the efficiency of our work.

Course VII. *Biology.* — The work of the biological department has been successfully conducted by Professor Sedgwick, assisted by Dr. E. G. Gardiner on the zoological side, and by Mr. G. V. McLauthlin, of the class of 1888, in the laboratory. Professor Sedgwick has also continued to serve as biologist to the State Board of Health; and a portion of the sanitary work of the Board has been done in the biological laboratory of the Institute. During last winter, Lowell was visited by a severe epidemic of typhoid fever, and Professor Sedgwick was called to make an investigation of the drinking water of that city. That he was able to bring that investigation to a satisfactory conclusion was largely due to the thorough modern equipment of the chemical and biological laboratories of the Institute. His report upon this epidemic forms an important contribution to sanitary science. Possibly some members of the corporation do not realize how far the Institute of Technology

offers opportunities for the pursuit of the theory and practice of sanitary science through the organization, already effected, of the sanitary side of the biological department, through the facilities provided for such work by the departments of chemistry and hydraulic engineering, and through the unique and invaluable sanitary library bequeathed to the school by the late Professor William Ripley Nichols.

A new course on sanitary science and the public health, conducted by Professor Sedgwick, through both laboratory investigation and lectures, is given in the second half of the senior year to the members of the departments of civil engineering, sanitary engineering, architecture, biology, and general studies. This year, also, for the first time, a class of sanitary engineers is following systematic work in bacteriology. As an introduction to the theory and practice of water purification and sewage disposal, this course has already proved the wisdom of its establishment. With these additional calls upon the biological department, however, has come a pressing demand for space. Much of the new work is of the most delicate nature, and requires a degree of quiet and of freedom from dust which it is difficult to secure under existing conditions. It is only at the sacrifice of much time and effort that the work of the department is at present carried on within its limited quarters. A special laboratory for this service is even now very much needed; and if the development of this side of the Institute continues, something must be done, ere long, to enlarge its borders.

Course IX. *General Studies.* — The past year has witnessed a fortunate normal growth in Course IX. The more commodious quarters have been occupied by a continually increasing number of students. The disposition on the part of members of other courses to avail themselves of the opportunities for liberal training offered in Course IX. classes has been noticeable and gratifying. Not a few

have chosen historical, economic, and philosophical studies, as extra work; and still others have carried on courses of reading in such subjects under the direction of Course IX. instructors. I have already in this report expressed the hope that the excellent facilities here offered for historical, political, and philosophical study will, in a near future, induce very many of our students, including our best scholars, to extend their courses to five years. Mr. W. Z. Ripley, of the class of 1890, who remained at the Institute the year after his graduation, for economic and historical study, was, at the beginning of the present year,¹ elected a Fellow in the school of Political Science at Columbia College; and is now pursuing his studies in that institution with the highest promise of success. The library of political science has profited greatly, as have so many of the other departmental libraries, by Mrs. Rogers' gift of books. Course IX. has been much strengthened by the appointment, already recited, of Mr. Currier, to whom have been assigned the classes in comparative politics, constitutional history, and international law.

Course X. *Chemical Engineering.*—Students were graduated from this course for the first time in May, 1891. Up to the beginning of the fourth year, the work consists substantially of studies and exercises belonging either to the mechanical engineering or to the chemical course. While the work of the senior year has much in common with the course in mechanical engineering, it has little in common with the course in chemistry. It is designed to deal with chemical problems from the manufacturing rather than the analytical side. A course of reading, lectures, and recitations upon applied chemistry begins with the first term. This course is designed to last through twelve weeks, and is being given for the first time this year. In this course, the applications of organic chemistry to manufacturing are discussed in much greater detail, and with more attention to the machinery used, than is possible in the elementary instruc-

tion in industrial chemistry given in the third year. The industries specially considered are the manufacture of petroleum products, fats, fatty oil and soaps, essential oils and resins, starch and glucose, the fermentation industries, milk products, paper-making and tanning and the making of glue. This is to be followed by a course, given for the first time last year, in which various engineering problems are discussed from a chemical point of view. The leading topics considered in this course are fuels, their composition and consumption, boiler waters and incrustations, corrosion of boilers, and other similar questions. This instruction will occupy eighteen weeks.

The optional instruction upon heat measurements offered to the students of the course, by Professor Holman of the physical department, is being given this year, for the first time, to two of the last year's graduates in Course X. Determinations of the heat of combustion of fuels, and the testing and use of certain pyrometers have been begun in the laboratory, accompanied by lectures upon the same subjects. In the second term, Professor Peabody discusses with the students of this course, the special machinery which falls within the scope of chemical engineering. This course of instruction, which is termed "technical machinery," includes a discussion of winding, blowing, and pumping engines, air compressors and compressed air engines, air and ammonia refrigerating machines and absorption refrigerating apparatus, rock and diamond drills and steam stamps, centrifugal extracting and drying machines, pressing and filtering machines, and multiple-effect evaporators.

The laboratory work peculiar to Course X. begins about Nov. 1 and continues through the year. Its scope and character are sufficiently indicated by the titles of the graduating theses of the Class of 1891, which are as follows: "A study of the effect of a live steam feed-water purifier upon the composition of the feed-water." "The production of chlorine and sodium hydrate by the elec-

trolysis of common salt." "On the heat of vaporization of ammonia." "The relative illuminating effects of different forms of gas burners," and "An investigation of certain problems connected with the bisulphite process for making chemical fibre."

The number of students taking this course shows a steady increase. The new course already stands fourth in point of numbers, as regards the division of the students in the second year, having seventeen regular students. It is evident that a special laboratory, independent of the laboratory of industrial chemistry, must be provided in the near future, if the unlooked-for growth in numbers in the course of chemical engineering continues. This laboratory must be a laboratory for research and must be equipped with a view to the study and testing of the machinery and appliances used in industrial chemistry. It will necessarily differ widely in its aims from the industrial chemical laboratory which is designed to give to students practice in the making of chemicals. The work connected with Course X. now demands most of the time of Professor Norton. The interest taken in the instruction given by us in industrial chemistry and in chemical engineering is shown by the frequent applications made to us by other educational institutions for advice and information.

Course XI. Sanitary Engineering.—In this course, established in 1889, students this year become, for the first time, candidates for the degree of the Institute. The scheme of studies pursued has been essentially as outlined at the beginning. That is to say, the students have followed in the main the regular civil engineering course; but, at the expense of a certain amount of time taken from bridge and railroad work, have prosecuted, for three years, a connected line of studies and laboratory practice in chemistry and biology as applied to sanitary engineering. They have thus received a special and valuable training for dealing with sanitary problems of water supply and

sewage disposal. In the fourth year the study of heating and ventilation is also taken up, and in connection with this, analyses are made of samples of air collected from various audience rooms. Special laboratory work, such as tests upon traps and other house-drainage devices, tests of the strength of sewer pipe, etc., will be undertaken by students of this course during the second term of the present school year.

Course XII. *Geology.* — The establishment of this course was announced in my report last year. One student, who had previously taken a sufficient amount of geological and correlated studies at the Institute to meet the requirements of the first three years, was at once admitted as a regular student of the fourth year, and at its close became the first graduate of the course as it now exists. The results presented in the graduating thesis were of scientific merit; and some of them will soon appear, in connection with other studies in the same direction, in two of our leading scientific journals. At present there are students, regular or special, enrolled in each year of the course; and instruction is now in progress in all the regular geological subjects which were introduced by the organization of the course.

The schedule of studies first adopted has been so far satisfactory that it has not been changed. It provides for an unusual amount of study and practice in surveying and topography. This proves to be, as was anticipated, a strong feature of the course, and has elicited very favorable comments by geologists who devote their time to the work of surveys and investigations. It is firmly believed that this association of studies will meet with continued approval. A collection for use in teaching economic geology has been started; but it will necessitate some expense and labor to make it satisfy the immediate needs of the Institute. The appliances for teaching micro-lithology have been somewhat improved; but there is a necessity for a further ad-

vance in this direction. The facilities for palæontology must receive immediate attention. The geological library has been increased by gifts from Mrs. Rogers and by other accessions; but until additional shelf-room is provided, it cannot be catalogued or satisfactorily arranged.

By the courtesy of J. H. Maiden, Esq., curator of the Technological Museum of Sydney, N. S. W., we have received an important collection of Australian wools, of all classes, numbering about four hundred samples. The collection is prepared in such a manner as greatly to enhance its usefulness. It forms a most welcome addition to our collections.

THE NEED OF ENDOWMENTS.

The continued growth of the school makes even more startling the danger which menaces the Institute of Technology from the lack of adequate endowments; it might almost be said, of any endowments at all. So tempting have been the educational opportunities offered to this school at every stage of its development, so imperative and various have been the demands coming from the industries of Massachusetts and New England, that there has been no possibility of stopping long enough at any point in our extraordinary growth and development, to accumulate considerable financial means, as a security for the future and as a reserve against disaster. Year by year, with few exceptions, all that could be provided has had to go to make room for the ever-increasing throng of students resorting to our halls, or to purchase the costly machines and apparatus required to keep the instruction at the Institute continually improving, up to the full needs of professional practice. Since the opening of the Institute in 1865, all that its friends could possibly give has had to go into buildings, furniture, plant, books, drawings, machinery and apparatus, except only the sum of \$485,908.69, which is all we have of income-yielding property.

With this, compare our expenditures of last year, which amounted to \$238,676.91, although a rigid economy was exercised, and although our professors and teachers are very inadequately remunerated for services that are literally invaluable. Our annual expenditure is thus seen to be equal to one-half the total productive property of the school! Such a situation is most dangerous. An institution, doing the work which the Institute of Technology is carrying on, ought to have an ample endowment, as a guarantee of the future; as a reserve against disaster; as a means of securing the continually progressive improvement of all its departments and services; and as a fund for reducing the tuition of deserving but needy students. Does not such a situation make a strong claim upon all who believe that this school of Industrial Science has done, is doing, and is capable, in still higher grades yet, of doing a noble work, alike for education and for industrial progress, to contribute by every means in their power to the adequate permanent endowment of the Institute?

THE GRANT FROM THE UNITED STATES.

In my report a year ago, I called the attention of the Corporation to the provisions of an Act of Congress approved Aug. 30, 1890, "for the more complete endowment and maintenance of colleges for the benefit of agriculture and the mechanic arts now established, or which may hereafter be established, in accordance with an Act of Congress approved July 2, 1862." It was then assumed, as a matter of course, that the Massachusetts Institute of Technology would share in the benefits of the grant of 1890, as in those of the grant of 1862; but it was suggested that, should other legislation be required to enable the Commonwealth to avail itself of the new grant from the Treasury of the United States, the Corporation of the Institute should memorialize the General Court at its approaching session.

to award to the Institute, as the College of Mechanic Arts for the State of Massachusetts, a somewhat larger share of the annual income thus to be received from the United States. This suggestion met the approval of the Corporation, which, by vote of the tenth of December, 1890, authorized its officers to memorialize the Legislature in that sense. The following memorial was accordingly presented to the Legislature :—

To the Honorable Senate and House of Representatives of the Commonwealth of Massachusetts, in General Court Assembled :

“The undersigned, officers of the Massachusetts Institute of Technology, do, on behalf of the said Institute, being thereunto specially authorized and empowered, memorialize your honorable bodies as follows, to wit :—

“By an Act of Congress dated July 2, 1862, provision was made for the creation and endowment of a college or colleges of ‘agriculture and the mechanic arts’ in each State of the Union.

“By an Act of the General Court of Massachusetts, approved April 27, 1863, it was provided that of the income of the fund so constituted in and for this Commonwealth, under the national grant as recited, one third be annually paid to the Massachusetts Institute of Technology, and two thirds to the Agricultural College at Amherst. This Act has been continuously in operation since 1863; and the Institute of Technology is still in receipt of one third of the annual income of the national grant of 1862, the payment into its treasury during the last fiscal year, upon that account, having been \$4,960.82.

“By an Act of Congress approved Aug. 30, 1890, entitled ‘An act 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 ap-

proved July 2, 1862,' the sum of \$15,000 was granted to the Commonwealth of Massachusetts for the fiscal year 1889-90, and for each succeeding year, except that the sum of \$1,000 is yearly to be added to the grant until a maximum of \$25,000 shall be reached, after which the annual grant shall remain at that sum and limit. As one of the two beneficiaries under Act of Congress, approved July 2, 1862, and the Act of the General Court of Massachusetts, approved April 27, 1863, the Massachusetts Institute of Technology through us, its agents and representatives thereunto duly authorized, petitions your honorable body that at least one half the annual grant from the Treasury of the United States, under the Act of Aug. 30, 1890, may be set apart and awarded to the Institute of Technology, as the College of Mechanic Arts in and for the Commonwealth.

"In asking that the share of the new grant assigned to the Institute of Technology, may be greater than that conferred by the Act of April 27, 1863, your memorialists have, they believe, no more than a due regard to the importance of the manufacturing and mechanical interests of Massachusetts, and to the extent of the work of instruction, with its necessary accompanying expenditures, which is carried on in this School of Industrial Science.

"The national grant of July 2, 1862, is frequently spoken of as if it were for the establishment of 'Agricultural Colleges,' solely; but this can only be attributed to ignorance of the history and the actual provisions of that act. The Mechanic Arts are firmly, and indissolubly joined with Agriculture, alike in the title, and in the body of the law; and that, too, upon no unequal terms. If agriculture was first mentioned, it was because one, or the other, must have necessarily such precedence; and because, taking the United States as a whole, agriculture was then, as it still remains, the chief single industrial interest of the people. But while this is true of the country taken together,

it is not true of Massachusetts, where manufacturing and mechanical industries employ six times as many of the people as does agriculture. We do not adduce this preponderance of industrial interest on the side of manufactures, as constituting a reason why this institution, which is the chartered College of Mechanic Arts for Massachusetts, should receive a disproportionate share of the bounty of the National Government ; but we do desire most respectfully to urge that not less than a full half of the new grant should be so assigned.

“ At the time the Act of April 27, 1863, was passed, the proportions, therein established, viz: one third to the Institute of Technology, two thirds to the Agricultural College, might have seemed not unreasonable. The Institute of Technology then existed only upon paper. It was, as yet, a mere scheme ; and many were doubtful whether it would ever be much more. It had not a pupil or a teacher, a building or a foot of land which it could call its own. Even those then most sanguine of its future had but a faint conception of what it might become. To-day, after a quarter of a century of zealous and disinterested effort, the Massachusetts Institute of Technology stands the largest scientific and technical school in the United States, and one of the most important in the world. Although this school is resorted to by students from thirty-eight States of the Union and from nearly a score of foreign countries and states, yet of its nine hundred and thirty-seven pupils, at present pursuing courses in civil, mechanical, electrical, mining, chemical and sanitary engineering, architecture, chemistry, biology, physics, and geology, five hundred and seventeen, or fifty-five per cent of the whole number, are residents of the Commonwealth. While hundreds of Massachusetts boys, here educated, have gone out all over the land to practise their professions, it yet remains true that not less than forty-six per cent of the graduates of the school are still citizens of the

Commonwealth, engaged upon its railroads, in its mills and factories, in the sanitary and engineering service of its cities, or in other occupations connected with the development of the material interests of the State.

“While we can thus point with pride to the services which the Institute of Technology has rendered and is still rendering to the Commonwealth, it remains to be said that its wants are in proportion to the extent and value of the work it has undertaken to perform. Its needs are so great because it is itself so much needed. As yet without any considerable endowments, the Institute is compelled to draw its support chiefly from tuition fees, which are inadequate to supply all the demands of the most advanced instruction.

“There is no single department of the school in, which large additional expenditures might not immediately be made with the highest advantage to the industries of the Commonwealth. Your memorialists will not further occupy the attention of the General Court, but hold themselves ready, whenever called upon, to present whatever information may be desired regarding the history, condition, organization and plans of the Institute.” (*Signed by the President, Secretary and Treasurer.*)

Should it be my privilege to present to the Corporation the President's Annual Report for December, 1892, I shall deem it a part of my task at that time to recite and comment upon the legislative history of this memorial; but inasmuch as the matter of the national grant of 1890 is now before the Supreme Court of Massachusetts, on a bill brought by the Agricultural College, at Amherst, asking that the treasurer of the Commonwealth be compelled to pay over to that institution the entire sum received, and to be received, under the Act of 1890, I will now merely say that the legislature passed an act which was approved by the Governor, June 11, 1891, in the following terms:—

[CHAP. 423.]

AN ACT TO ASSENT TO THE PURPOSE OF AND TO ACCEPT THE GRANTS OF MONEY AUTHORIZED BY CONGRESS FOR THE MORE COMPLETE ENDOWMENT AND SUPPORT OF COLLEGES FOR THE BENEFIT OF AGRICULTURE AND THE MECHANIC ARTS.

Be it enacted, etc., as follows:

SECTION 1. The Commonwealth of Massachusetts hereby assents to the purpose of the grants of money authorized by the Act of Congress, 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," said act being chapter eight hundred and forty-one of the acts of the first session of the Fifty-first Congress and approved on the thirtieth day of August in the year eighteen hundred and ninety.

SECTION 2. The Commonwealth of Massachusetts hereby accepts the annual grant of moneys made by the United States as set forth and defined in said Act of Congress, and the treasurer and receiver-general of this Commonwealth is hereby designated to receive the same annually, to be applied by him under and for the purposes of said act; and the Massachusetts Institute of Technology is hereby authorized to receive one third and the Massachusetts Agricultural College two thirds of said grant of money, unless the courts should decide that the Act of Congress granted all said money to the Massachusetts Agricultural College.

SECTION 3. The Governor of the Commonwealth is hereby authorized and instructed to give due notice thereof to the government of the United States.

SECTION 4. This act shall take effect upon its passage. [*Approved June 11, 1891.*]

Under the provisions of this Act the Institute of Technology would receive \$5,000.00 for the year 1890; \$5,333 $\frac{1}{3}$ for 1891; \$5,666 $\frac{2}{3}$ for 1892, and so on by annual increments of \$333 $\frac{1}{3}$, up to a final maximum of \$8,333 $\frac{1}{3}$ in 1900.

CONCLUSION.

It is now full ten years since, at the call of the Corporation, I was introduced to this body by my illustrious predecessor, Dr. Rogers, and became the President of the Institute of Technology. With all my heart I make acknowledgment of the kindness, the generosity, the scru-

pulous consideration with which the Corporation, individually and collectively, have made good their pledge, then given, to stand by me in my administration. The duties of the office have been rendered comparatively light by the confidence and the strong support which have uniformly been extended to me by my colleagues on this Board.

I long ago said that the greatest crisis through which a young institution of learning is called to pass, is, not with respect to its general scheme of work, not with respect to its finances, not with respect to its Faculty, but with respect to its Board of Trustees. It was inevitable that the Massachusetts Institute of Technology, so young yet so ambitious, attempting so much with so little in the way of experience to go by, and so little to do with, should pass through crises of each kind indicated; but the extraordinary success which has crowned this educational enterprise proves that, alike in its general scheme of work, in its Faculty and staff of instruction, and in the control and direction exercised by the Corporation, the Institute, in spite of all misfortunes and all mistakes, has been singularly fortunate.

Especially do I desire to express my deep sense of the services rendered to the Institute, as well as of the official confidence and personal kindness uniformly extended to myself, by the Executive Committee, since the constitution of that body in 1883. The close continuous attention given to the affairs of the school by the members of the Executive Committee has been one element of great strength in our recent growth. Habitually every member is present at every meeting held; and thus the Institute is given the full benefit of all the knowledge and experience of the whole committee, acting in perfect harmony, with a clear understanding of the situation, and with the most zealous regard for the good of the school.

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, 1891.

By deed of Mrs. Martha Ann Edwards, dated Nov. 21, 1876, there were conveyed to the Institute two-thirds of the estate at Lenox, Mass., known as "Highlawn," subject, however, to certain life estates and other reservations. Those having the life estates in this property have since died, and during the past year the Institute has in compliance with the provisions of the original deed sold its interest in the property for the sum of thirty thousand dollars, which sum has been invested and constitutes the Martha Ann Edwards Fund.

During the year there has been paid to the Institute by the executors of the will of the late Mrs. Charlotte B. Richardson a legacy of thirty thousand dollars for the benefit of the department of Industrial Chemistry. This by the terms of the will is to be called the Charlotte Billings Richardson Fund.

This legacy was paid by the transfer to the Institute of one hundred and forty-eight shares of stock in the Boston & Albany Railroad Company at its market value at the time, two hundred and two and one quarter dollars per share, and the payment in cash of the balance, amounting to sixty-seven dollars.

In October, 1890, an agreement was made between Mr. Albert A. Pope and the Institute. By this agreement Mr. Pope generously undertakes to pay to the Institute for five years the sum of twelve hundred dollars annually, and the Institute agrees to use the sums so received for instruction in street building and highway engineering.

The following bonds have been paid or sold:—

Grand Rapids, Newaygo & Lake Shore Railroad 8s (paid at maturity)	\$34,000 00
Burlington & Missouri River Railway in Nebraska 6s (called and paid)	1,000 00
Atchison, Topeka & Santa Fe Railroad Income 5s \$8,900 (sold)	5,629 25
	<hr/>
	\$40,629 25

With the proceeds the following securities have been bought:—

\$37,000 Chicago Junction Railway & Union Stock Yards 5s	\$33,655 00
\$2,000 New York & New England Railroad 1st, 6s	2,240 00
\$4,000 Kansas City, Fort Scott & Gulf Railroad 7s	4,400 00
	<hr/>
	\$40,295 00

The income of the Institute for the past year has been divided at the rate of $5\frac{84}{100}$ per cent among the funds to which it belongs.

Besides the gifts from the estates of Mrs. Edwards and Mrs. Richardson and from Mr. Pope, already referred to, other gifts have been received, as follows:—

Mrs. William B. Rogers, for periodicals	\$ 200 00
Augustus Hemenway, Esq	1,000 00
Alumni of Institute toward William B. Rogers Scholarship Fund	650 00

The net result of the year has been an expenditure over income of \$3,440.59, which has been charged against Massachusetts Institute of Technology Account.

GEORGE WIGGLESWORTH, TREAS., *in account with*

GENERAL STATEMENT OF RECEIPTS AND DISBURSEMENTS

Dr.

Cash balance Sept. 30, 1890		\$5,392 71
From Augustus Lowell for Lowell Courses	\$3,600 00	
" " " " C. Kastner's salary	2,500 00	
" " " " Lowell School of Design	1,000 00	
	<hr/>	7,100 00

RECEIPTS FOR CURRENT EXPENSES.

Income of funds for salaries	\$4,818 00	
" " " " scholarships	4,070 00	
" " " " Joy "	200 00	
" " " " Swett "	400 00	
" " " " Library	275 00	
" " " " general purposes	11,955 52	
" " Rogers Memorial Fund	12,511 25	
Students' fees	177,818 65	
State Agricultural Fund	5,640 97	
Laboratory breakage and supplies	4,525 12	
Rents, per Table. (Page 12)	6,330 00	
Gifts	1,200 00	
Interest	2,646 93	
Pope Fund used	418 88	
Boston University	1,150 00	
Sale printed Lecture Notes	2,176 00	
Profit and Loss, expenses more than income (see per contra)	3,440 59	
	<hr/>	238,676 91

BEQUESTS, NEW TRUSTS, ETC.

Martha Ann Edwards General Fund	\$30,000 00	
Charlotte Billings Richardson Industrial Chemistry Fund	30,000 00	
Albert A. Pope, for Street Building and Highway Engineering, amount not used	781 12	
Letter Box Fund, balance	82 67	
Income James Savage Fund, not used	218 94	
" James H. Mirrlees Fund, " "	24 27	
" William Barton Rogers Fund, " "	301 49	
" Elisha Thacher Loring Fund, " "	83 68	
" Richard Perkins Fund, " "	378 23	
Income Charlotte Billings Richardson Fund, not used	825 00	
Increase Wm. Barton Rogers Scholarship Fund	650 00	
	<hr/>	63,345 40

SALE OF SECURITIES, GENERAL FUND.

Burl. & Mo. Riv. R. R. in Neb., Bond called	\$1,000 00	
Atchison, Topeka & Santa Fé, Incomes	298 88	
Transferred to Rogers Memorial Fund	1,687 50	
	<hr/>	2,986 38

SALE OF SECURITIES WM. B. ROGERS MEMORIAL FUND.

Grand Rapids, Newaygo & L. S. R. R. 8s matured	\$34,000 00	
Atchison, Topeka & Santa Fé, Incomes	5,330 37	
	<hr/>	39,330 37

SUNDRIES.

Students' Notes Receivable paid	\$1,257 00	
Income General Funds credited to Advance Bond Premium Account	2,412 12	
Income Wm. B. Rogers Memorial Fund credited to Advance Bond Premium Account	1,650 75	
	<hr/>	5,319 87
		<hr/> <hr/>
		\$362,151 64

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

FOR THE YEAR ENDING SEPTEMBER 30, 1891.

Cr.

Paid for Lowell Courses	\$3,600 00	
“ “ Charles Kastner's salary	2,500 00	
“ “ Expense Lowell School of Design	1,245 52	
		\$7,345 52

EXPENSES.

Salaries, per Table. (Page 12)	\$160,229 95	
“ paid from the Pope Fund	350 00	
Scholarships	4,270 00	
“ paid from Swett Fund	200 00	
“ “ “ Savage “	200 00	
Repairs, per Table. (Page 12)	6,948 66	
General Expense, per Table. (Page 13)	9,180 83	
Fuel	8,002 61	
Water	1,220 20	
Gas	1,758 21	
Printing and Advertising	3,123 02	
“ Lecture Notes	2,401 21	
“ Annual Catalogue	1,480 92	
Rents paid Boston & Albany R. R. Co.	180 00	
“ “ Natural History Society	600 00	
Laboratory Supplies and Libraries, per Table. (Page 12)	25,857 92	
Society of Arts	305 18	
Interest, $5\frac{84}{100}$ per cent on \$211,784.20, funds not in stocks and bonds	12,368 20	
		238,676 91

INVESTMENTS, ETC.

Securities, General Account, 148 Shares Boston & Albany R. R. Co.,	\$29,933 00	
Kansas City, Fort Scott & Gulf R. R. 7s,	2,200 00	
C. L. Flint Scholarship Fund, more than income	40 23	
		32,173 23

SECURITIES BOUGHT FOR WM. B. ROGERS MEMORIAL FUND.

Chicago Junction Ry. and Union Stock Yards 5s, 37,000.00	\$33,762 92	
New York & New England R. R. first 6s, \$2,000.00,	2,274 33	
Kansas City, Fort Scott & Gulf R. R. 7s, \$2,000.00,	2,289 44	
Transferred from General Securities	1,687 50	
		40,014 19

SUNDRIES.

Gymnasium Building Addition	\$1,627 25	
Paid on account New Boiler No. 2	4,392 41	
Notes Receivable	25,476 75	
Profit and Loss, per contra	3,440 59	
		34,937 00
Cash Balance, Sept. 30, 1891		9,004 79
		\$362,151 64

The following account exhibits the property held by the Institute, as per Treasurer's books, Sept. 30, 1891:—

INVESTMENT OF THE W. B. ROGERS MEMORIAL FUND.

Saginaw & Western R. R. 6s	\$50,000 00	
Chicago Junc. Ry. & Union Stock Yards 5s (\$37,000)	33,655 00	
Burlington & Mo. River R. R. 4s (\$30,000)	25,787 50	
Kansas City Belt R. R. 6s	25,000 00	
Mo. Valley, Blair Ry. & Bridge Co. 6s	20,000 00	
Atchison, Topeka & Santa Fé R. R. 4s (\$18,000)	15,372 30	
Kansas City, Clinton & Springfield R. R. 5s	16,000 00	
Omaha & Southwestern R. R. 8s	7,000 00	
Republican Valley R. R. 6s	5,400 00	
Cin., Ind., St. Louis & Chicago R. R. 6s	4,000 00	
Ottawa, Oswego & Fox River R. R. 8s	2,000 00	
New York & New England R. R. First 6s	2,000 00	
Kansas City, Fort Scott & Gulf R. R. 7s	2,000 00	
Kansas City, Memphis & Birmingham R. R. 5s (\$2,000)	1,905 00	
Lincoln & Northwestern R. R. 7s	1,000 00	
Atchison & Nebraska R. R. 7s	1,000 00	
Advances to Bond Premium account	15,439 35	
Bonds	\$227,559 15	
220 shares Chicago, B. & Quincy R. R. Stock	22,000 00	
		\$249,559 15

INVESTMENT OF THE JOY SCHOLARSHIP FUND.

Mass. Hospital Life Insurance Co.	\$5,000 00	
Deposits in Savings Banks	3,159 63	
		8,159 63

INVESTMENT SWETT SCHOLARSHIP FUND.

Mass. Hospital Life Insurance Co.	10,000 00
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INVESTMENT OF OTHER TRUSTS.

Atchison, Topeka & Santa Fé R. R. 6s	\$50,000 00	
Quincy & Palmyra R. R. 8s	25,000 00	
Burlington & Mo. River (Nebraska) R. R. 6s	18,000 00	
“ “ “ (Land Grant) R. R. 7s	15,000 00	
Chicago, Burlington & Quincy R. R. 7s	7,000 00	
“ “ “ “ “ (\$6,000)	5,100 00	
Milwaukee & St. Paul R. R. 7 $\frac{3}{10}$	3,000 00	
Cincinnati & Indiana R. R. 7s	2,000 00	
Chicago, Burlington & Northern R. R. 5s	2,000 00	
Kansas City, Fort Scott & Gulf R. R. 7s	2,000 00	
International & Great Northern R. R. 6s	1,000 00	
Union Pacific R. R. 6s	1,000 00	
Advances to Bond Premium account	4,748 91	
Bonds	135,848 91	
<i>Amount carried up</i>		\$403,567 69

Amount brought up \$403,567 69

STOCKS.

148 shares Boston & Albany R. R.	\$29,933 00	
154 " Chicago, Burlington & Quincy R. R.	15,400 00	
12 " Coheco Manufacturing Co.	6,000 00	
55 " Old Boston National Bank	5,510 50	
50 " Hamilton Woollen Co.	5,000 00	
82 " Morris & Essex R. R.	4,100 00	
27 " Essex Co.	4,050 00	
75 " Pennsylvania Coal Co.	3,750 00	
35 " Everett Mills.	3,150 00	
40 " New York & Harlem R. R.	2,000 00	
20 " Pittsburg, Fort Wayne & C. R. R.	2,000 00	
15 " Consolidated Gas Co., New York	1,447 50	
		<u>82,341 00</u>

REAL ESTATE.

Rogers Building	\$315,726 88	
Walker Building	190,492 44	
Land on Garrison Street	\$50,840 00	
Workshops " "	52,416 49	
		<u>103,256 49</u>
Land on Trinity Place	\$76,315 69	
Engineering B'ld'g, Trinity Place	106,616 87	
		<u>182,932 56</u>
Gymnasium Building.	5,340 61	
		<u>797,748 98</u>
Equipment, Engineering Building	\$16,555 24	
" Workshops	20,628 56	
		<u>37,183 80</u>

SUNDRIES.

Notes Receivable	\$26,976 75	
Students' Notes	2,400 00	
New Boiler No. 2 Account	5,000 00	
Lowell School of Design	461 97	
Cash Balance, Sept. 30, 1891	9,004 79	
		<u>43,843 51</u>
		<u>\$1,364,684 98</u>

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	\$52,255 20
James Savage "	11,472 34
Mrs. Susan H. Swett Fund	10,182 95
William Barton Rogers Fund	8,835 51
Joy Fund	8,159 63
Elisha Thacher Loring Fund	5,241 52
Charles Lewis Flint Fund	5,137 35
Thomas Sherwin Fund	5,000 00
Farnsworth Fund	5,000 00
James H. Mirrlees Fund	2,647 27

113,931 77

OTHER TRUSTS

Charlotte Billings Richardson, Industrial Chemistry Fund	30,825 00
Charles Lewis Flint, Library Fund	5,000 00
Albert A. Pope, Street Building and Highway Engineering, Fund, balance	781 12
Letter Box Fund, balance	82 67

MISCELLANEOUS.

Notes Payable	\$20,000 00
Students' Deposits	450 00
Subscription of 1887	123,500 00
M. I. T. Stock Account	526,507 18

670,457 18

\$1,364,684 98

COMPARATIVE STATEMENT OF FUNDS, ETC.

	Sept. 30, 1890.	Sept. 30, 1891.
Trusts for general purposes	\$426,007 24	\$456,007 24
Salaries	87,600 00	87,600 00
Scholarships	112,315 39	113,931 77
Library	5,000 00	5,000 00
Charlotte Billings Richardson Industrial Chemistry Fund		30,825 00
Albert A. Pope Street Building and Highway Eng. Fund		781 12
Letter Box Fund		82 67
Notes Payable	20,000 00	20,000 00
Students' Deposits	450 00	450 00
Subscription of 1887	123,500 00	123,500 00
M. I. T. Stock Account	529,947 77	526,507 18
	<hr/>	<hr/>
Increase	\$1,304,820 40	\$1,364,684 98
Consisting of: —	59,864 58	
Martha Ann Edwards Fund	30,000 00	
Charlotte Billings Richardson Fund	30,000 00	
“ “ “ Income	825 00	
Increase Wm. Barton Rogers Scholarship Fund	650 00	
Scholarship Funds, not used	966 38	
Increase Albert A. Pope Fund, balance	781 12	
Letter Box Fund, balance	82 67	
	<hr/>	
	\$63,305 17	
Less Loss. Expenses more than Income	3,440 59	
	<hr/>	<hr/>
		\$59,864 58

INCOME FROM GENERAL INVESTMENTS, AND APPLICATION THEREOF.

<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Applied to Salaries</td> <td style="text-align: right; width: 20%;">\$4,318 00</td> </tr> <tr> <td>“ “ Scholarships</td> <td style="text-align: right;">4,070 00</td> </tr> <tr> <td>“ “ Library</td> <td style="text-align: right;">275 00</td> </tr> <tr> <td>“ “ General Purposes</td> <td style="text-align: right;">11,055 52</td> </tr> <tr> <td>“ “ Increase of Funds</td> <td style="text-align: right;">1,791 38</td> </tr> <tr> <td>“ “ Advances to Bond Premiums</td> <td style="text-align: right;">2,412 12</td> </tr> <tr> <td colspan="2" style="border-top: 1px solid black; text-align: right; padding-top: 5px;">\$24,422 02</td> </tr> </table>	Applied to Salaries	\$4,318 00	“ “ Scholarships	4,070 00	“ “ Library	275 00	“ “ General Purposes	11,055 52	“ “ Increase of Funds	1,791 38	“ “ Advances to Bond Premiums	2,412 12	\$24,422 02		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">From Dividends, Old Boston National Bank</td> <td style="text-align: right; width: 20%;">\$330 00</td> </tr> <tr> <td>“ State Tax returned, Old Boston National Bank</td> <td style="text-align: right;">81 82</td> </tr> <tr> <td>“ Railroad Bonds</td> <td style="text-align: right;">8,054 00</td> </tr> <tr> <td>“ Dividends, Pittsburg, Ft. W. & C. R. R. Stock,</td> <td style="text-align: right;">140 00</td> </tr> <tr> <td>“ “ Pennsylvania Coal Co.</td> <td style="text-align: right;">600 00</td> </tr> <tr> <td>“ “ Everett Mills.</td> <td style="text-align: right;">192 50</td> </tr> <tr> <td>“ “ Essex Co.</td> <td style="text-align: right;">297 00</td> </tr> <tr> <td>“ “ Cocheco Mfg. Co.</td> <td style="text-align: right;">240 00</td> </tr> <tr> <td>“ “ Consolidated Gas Co., N. Y.</td> <td style="text-align: right;">75 00</td> </tr> <tr> <td>“ “ Chicago, Bur. & Q. R. R.</td> <td style="text-align: right;">654 50</td> </tr> <tr> <td>“ “ New York & Harlem R. R.</td> <td style="text-align: right;">210 00</td> </tr> <tr> <td>“ “ Hamilton Woollen Mills</td> <td style="text-align: right;">300 00</td> </tr> <tr> <td>“ “ Morris & Essex R. R.</td> <td style="text-align: right;">287 00</td> </tr> <tr> <td>“ “ Boston & Albany R. R.</td> <td style="text-align: right;">592 00</td> </tr> <tr> <td>“ Interest on Funds not in Bonds and Stocks @ 5.84%, the rate on earnings invested</td> <td style="text-align: right; vertical-align: bottom;">12,368 20</td> </tr> <tr> <td colspan="2" style="border-top: 1px solid black; text-align: right; padding-top: 5px;">\$24,422 02</td> </tr> </table>	From Dividends, Old Boston National Bank	\$330 00	“ State Tax returned, Old Boston National Bank	81 82	“ Railroad Bonds	8,054 00	“ Dividends, Pittsburg, Ft. W. & C. R. R. Stock,	140 00	“ “ Pennsylvania Coal Co.	600 00	“ “ Everett Mills.	192 50	“ “ Essex Co.	297 00	“ “ Cocheco Mfg. Co.	240 00	“ “ Consolidated Gas Co., N. Y.	75 00	“ “ Chicago, Bur. & Q. R. R.	654 50	“ “ New York & Harlem R. R.	210 00	“ “ Hamilton Woollen Mills	300 00	“ “ Morris & Essex R. R.	287 00	“ “ Boston & Albany R. R.	592 00	“ Interest on Funds not in Bonds and Stocks @ 5.84%, the rate on earnings invested	12,368 20	\$24,422 02	
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**INCOME FROM WILLIAM BARTON ROGERS MEMORIAL FUND,
AND APPLICATION THEREOF.**

Paid Massachusetts Institute of Technology 5% on Amount of Fund (\$250,225 00) . . . \$12,511 25 Credited to Advances Bond Premiums . . . 1,650 75 <hr style="width: 50%; margin-left: auto; margin-right: 0;"/> \$14,162 00	Received Income from Railroad Bonds . . . \$13,227 00 " Dividend 220 Shares Chicago, Bur- lington & Quincy R. R. . . . 935 00 <hr style="width: 50%; margin-left: auto; margin-right: 0;"/> \$14,162 00
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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	300 00	
State Board of Health, for use of Laboratories	875 00	
Boston Water Works, use of Laboratory	100 00	
Use of Lecture Rooms and Gymnasium	55 00	
		<u>\$6,330 00</u>

Department Supplies.

Chemical Department	\$7,611 15	
Physical "	4,852 85	
Mining "	1,218 52	
Mechanical Eng'r'g "	1,919 37	
Applied Mechanics "	687 85	
Civil Engineering "	2,768 00	
Biological "	865 87	
Geological "	280 75	
Architectural "	1,261 42	
Drawing "	45 32	
Mathematical "	12 20	
English "	1,258 81	
Workshops	1,790 60	
Modern Languages	141 90	
Periodicals	1,143 31	
		<u>\$25,857 92</u>

Salaries.

Instruction	\$131,894 30	
Administration	13,606 74	
Labor	14,728 91	
		<u>\$160,229 95</u>

Repairs.

Department Improvements: —		
Chemical Department	\$1,069 73	
Physical "	374 30	
Mechanical Eng'r'g"	261 78	
Mining "	909 53	
English "	79 85	
Architectural "	334 98	
Civil Engineering "	363 83	
Drawing "	203 72	
Biological "	234 41	
Workshops "	314 75	
		<u>\$4,146 88</u>
<i>Amount carried forward</i>		4,146 88

<i>Amount brought forward</i>		\$4,146.88
Boiler Room		272 53
Roofs of Rogers and Walker Buildings		256 48
" " Gymnasium		69 74
President's and Secretary's Offices		139 73
Reading Room		18 96
Gas in Engineering Building		54 40
Engine in Walker Building		35 75
Blackboards		97 00
Sundries		1,857 19
		<hr/>
		\$6,948 66
		<hr/>
General Expenses.		
Furniture		\$338 20
Window Shades		126 39
Electric Lighting:—		
Wiring, etc.	\$166 97	
Power furnished	150 61	
		<hr/>
		317 58
Fire Sprinklers		1,020 69
" Hose		36 45
Engine-room Supplies:—		
Oil	\$199 43	
Cotton Waste	56 16	
Pressure Valve	38 75	
Water Meter	52 00	
Grate Bars	30 85	
		<hr/>
		377 19
New Water Supply Pipe, Engineering Building		113 94
Chemical Department Equipment:—		
Ten Steam-dye Kettles		352 50
Paints, Varnish, etc.		289 24
Telephone, Rent of		53 48
Diplomas, Commissions, and Expense of Drills		368 60
Entrance Examinations		945 75
Legal Fees		50 00
Washing		332 34
Express Charges		373 20
Books and Supplies for General Library		319 91
Window Glass		76 90
Ventilation		109 70
Postage	1,199 60	
Ice		185 50
Stationery and Office Supplies		541 84
Workshops' Exhibit at Conference on Manual Training		61 44
Technology Quarterly Subscriptions to 100 copies, and Printing		170 00
		<hr/>
<i>Amount carried forward</i>		\$7,760 44

<i>Amount brought forward</i>	\$7,760 44
Lunch Room Supplies :—	
Crockery, etc.	139 07
Janitor's Supplies :—	
Brushes, Pails, Dusters, Soap, etc.	344 56
Towels, etc.	40 43
Mats, Waste Baskets, etc.	75 82
Boston Electric Time Co.	27 00
New Boiler, No. 2, Depreciation on account of	470 05
Income Real Estate, Lenox, Mass., balance	1 10
Sundries	322 36
	<hr/>
	<u>\$9,180 83.</u>

BOSTON, November 30, 1891.

An examination of the accounts of the Treasurer of the Massachusetts Institute of Technology for the year ending Sept. 30, 1891, 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.