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*To the Corporation of the Massachusetts Institute
of Technology.*

DURING the twelve months which have passed since I presented my last annual report, the school year 1884-85 has come to a successful termination, and the school year 1885-86 has auspiciously begun.

It was not my privilege to attend the closing exercises of the year past ; since, for the sake of much-needed rest, and with the consent of the Executive Committee, I had sailed for Europe three weeks previous to the graduating ceremonies. Professor Runkle was chosen by the Faculty to represent them on that occasion. Of the 30 students of the fourth year, who were candidates for the degree of Bachelor of Science, 27 were admitted to that degree.

The results of the annual examinations to determine the fitness of the students of the first, second, and third years, severally, to pass into higher classes, were on the whole very gratifying, showing, in comparison with the results of previous years, a steady rise in the degree of success attending the instruction in the Institute. I think it may fairly be said, that, while the present school opens with a larger number of students in each of the second, third, and fourth year classes than ever before in our history, it also opens with a higher average scholarship in each of those classes than was ever previously attained. This is due in part to the steady improvement, of late years, in the preparation for the work of the Institute afforded by the "fitting schools ;" and, in even larger measure, to the enlargement of the means of instruction here, including both a considerable increase in the numbers of the teaching-staff and a very great extension of the room, of the apparatus, and of the mechanical facilities generally, available for recitation, drawing, shop, and laboratory work.

The total number of persons registered in all the departments and schools under the control of the Corporation is 730; against an aggregate, last year, of 706.

Omitting from consideration the students of the Lowell Free School of Practical Design, the number this year is 669, against 645 last year. Still further excluding the number of students in the School of Mechanic Arts, we find the number of students in the School of Industrial Science to be 609, against 579 last year; making the increase here 30, or 5 per cent.

The following table exhibits the number of students in the School of Industrial Science, each year, from the opening the Institute to the present time:—

Year.	No. of Students.
1865-66	72
1866-67	137
1867-68	167
1868-69	172
1869-70	206
1870-71	224
1871-72	261
1872-73	348
1873-74	276
1874-75	248
1875-76	255
1876-77	215
1877-78	194
1878-79	188
1879-80	203
1880-81	253
1881-82	302
1882-83	368
1883-84	443
1884-85	579
1885-86	609

This aggregate is divided among the several classes as follows:—

Regular students, Fourth year	53
“ “ Third “	63
“ “ Second “	112
“ “ First “	187
Special students	194
	<hr/>
	609

If we should attempt further to distribute the body of special students according to the predominant studies pursued by them, we should reach the following approximate statement of the division of the whole number of students among the several years of the course:—

	Regular.	Special.	Total.
Fourth year	53	24	77
Third “	63	52	115
Second “	112	81	193
First “	187	37	224
	415	194	609

STATISTICS OF EXAMINATIONS.

The results of the applications for admission to all classes of the school of Industrial Science thus far in the current school year, and of the examinations had thereupon, may be stated as follows:—

Forty-nine were admitted without examination, either to the first year class upon presenting certificates of clear admission to some college of reputable standing, or, upon the presentation of diplomas of graduation from some degree-conferring institution, classical or scientific, to the third year class, or to some department as special students;

145 were admitted upon examination, free of conditions; 37 were admitted with one condition imposed; 26 were admitted with two conditions; 8 were admitted with three conditions; 36 applicants were rejected upon examination; 7 were admitted as special students, upon examination in the studies specially requisite to the partial courses which they proposed to follow.

The total number of applicants appears, therefore, to have been 308. Of those admitted upon examination, 39 have not thus far entered the school. In some instances, in the case of applicants heavily conditioned, this has been due to the advice of the Faculty, that a longer period be taken for preparation; in some, to a change of plans, to sickness, or other causes. The total number of applicants rejected or voluntarily withdrawing was thus 75.

The foregoing figures, in comparison with those of previous years, show a progressive improvement in the preparation of candidates for admission. Of the total number submitting to examination, the proportion of those who were admitted free of conditions was 56 per cent this year, as against 47 per cent last year, and only 33 per cent in 1883. This result is explained by the comment made, in my last annual report, upon the statistics of examination there presented; viz., that the improvement noted is mainly due to a better understanding of the requirements for entrance to the Institute, and to greater care and pains taken by teachers in the preparatory schools, generally, to meet those requirements.

EXAMINATIONS AT DISTANT POINTS.

In addition to the entrance examinations held in Boston in June and September, 1885, examinations were also conducted in June at Atlanta, Chicago, Cincinnati, Denver, Nashville, New Orleans, New York, Philadelphia, San Francisco, St. Louis, St. Paul, and Washington, generally with the assistance of the superintendents of the city schools, who co-operated with the Faculty in the most cordial manner.

STATISTICS OF RESIDENCE.

As was the case last year, thirty-three States of the Union, besides the District of Columbia, are represented on our lists of students. Canada, Scotland, Chili, Cuba, and Japan have also sent us students.

Of the total number of 415 students, in all the regular courses, 284 are from Massachusetts, 48 from other New-England States, and 83 from outside New England. Of the total number of 609, including special students, 387 are from Massachusetts, 78 are from other New-England States, and 144 from outside New England.

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

<i>State.</i>	Fourth Year.	Third Year.	Second Year.	First Year.	Total Reg.	Special.	Total.		Fourth Year.	Third Year.	Second Year.	First Year.	Total Reg.	Special.	Total.
Alabama	..	..	..	..	..	2	2	New Jersey	..	..	2	..	2	3	5
California	..	..	..	..	..	4	4	New York	..	2	3	5	11	6	17
Colorado	..	..	2	..	2	1	5	North Carolina	..	..	..	..	1	..	1
Connecticut	..	..	1	..	1	..	1	Ohio	..	1	3	2	6	12	18
Delaware	2	1	2	2	7	9	16	Oregon	..	..	1	..	1	..	1
District of Columbia,	..	..	1	..	1	..	1	Pennsylvania	..	1	2	6	9	6	15
Georgia	..	1	..	..	1	1	2	Rhode Island	..	..	3	6	9	3	12
Illinois	4	1	2	6	13	7	20	South Carolina	..	..	1	1	2	..	2
Indiana	1	..	..	..	1	..	1	Tennessee	..	..	..	..	..	2	2
Iowa	..	3	..	1	4	2	6	Vermont	..	2	..	1	1	4	6
Kansas	1	1	..	..	2	..	2	Virginia	..	1	1	2	4	1	5
Kentucky	1	..	..	1	2	3	5	Wisconsin	..	..	..	..	..	4	4
Louisiana	..	..	..	1	1	..	1		52	60	110	186	408	190	598
Maine	2	4	2	6	14	8	22	<i>Foreign Country.</i>							
Maryland	..	..	1	..	1	..	1	Chili	..	..	1	..	1	..	1
Massachusetts	35	40	77	132	284	103	387	Cuba	..	..	..	..	..	1	1
Michigan	..	..	1	2	3	..	3	Japan	..	..	1	..	1	..	1
Minnesota	..	..	1	1	2	3	5	New Brunswick	..	1	..	..	1	2	3
Mississippi	..	..	..	..	1	1	2	Prov. of Quebec	..	2	..	1	3	..	3
Missouri	..	..	..	1	1	1	2	Scotland	..	1	..	..	1	1	2
Nebraska	1	..	..	1	2	1	3		53	63	112	187	415	194	609
Nevada	..	..	..	..	..	1	1								
New Hampshire	..	5	3	6	14	8	22								

It will here be observed that the number of scholars, in all the classes, who have Massachusetts for their residence, is 387, being 63.5 per cent of the total number of students.

I have thought that an analysis of this large aggregate, to ascertain the numbers coming to us from the several counties and towns of the Commonwealth, might be interesting and instructive.

I find that of the 14 counties of Massachusetts, Dukes and Nantucket alone fail to appear. In the 12 counties represented, 94 cities and towns maintain students at the Institute. The first column of the following table shows the number of cities and towns in each county sending pupils; the second column, the aggregate number of pupils from each county. It appears that Suffolk, our own county, furnishes us 120 pupils; Middlesex County comes next, with 108; Essex, third, with 53; Norfolk, fourth, with 38; no one of the remaining counties sending so many as 20.

COUNTY.	No. of Towns.	No. of Students	COUNTY.	No. of Towns.	No. of Students
Barnstable . . .	5	5	Middlesex	26	108
Berkshire	2	5	Norfolk	12	38
Bristol	5	16	Plymouth	10	18
Essex	16	53	Suffolk	3	120
Franklin	1	2	Worcester	11	14
Hampden	2	7			
Hampshire	1	1		94	387

The following is a list of the towns, 26 in number, which send four or more scholars to the Institute:—

Boston	115	Plymouth	6	Beverly	4
Newton	27	Springfield	6	Canton	4
Brookline	14	Fall River	5	Chelsea	4
Cambridge	12	Hyde Park	5	Haverhill	4
Lawrence	10	Malden	5	Melrose	4
Somerville	10	Newburyport	5	Pittsfield	4
Lowell	9	Stoughton	5	Salem	4
Lynn	9	Andover	4	Winchester	4
New Bedford	7	Arlington	4		

PROPORTION OF OLD AND OF NEW STUDENTS.

The table following exhibits, for each year of the school's history, the distribution of the total number of students among two classes: first, those students remaining whose names are found upon the catalogue of the year preceding that for which the statement is given; 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 were reg- ular first year Students.	(5) No. of New Students not of the regular first year class.
1866-67	137	34	103	58	45
1867-68	167	79	88	54	34
1868-69	172	82	90	50	40
1869-70	206	90	116	63	53
1870-71	224	109	115	71	44
1871-72	261	122	139	82	57
1872-73	348	173	175	112	63
1873-74	276	171	105	59	46
1874-75	248	159	89	35	54
1875-76	255	139	116	65	51
1876-77	215	130	85	31	54
1877-78	194	96	98	47	51
1878-79	188	99	89	34	55
1879-80	203	102	101	34	67
1880-81	253	121	132	62	70
1881-82	302	136	166	86	80
1882-83	368	173	195	114	81
1883-84	443	231	212	140	72
1884-85	579	311	268	186	82
1885-86	609	369	240	177*	63

It appears from the foregoing, that the number of students remaining over has been increased by 58, while the number of students registered for the first time is smaller by 28; making the net gain in the School of Industrial Science, 30, as previously stated.

Of the 369 students remaining over from a previous registration, one was at the beginning of last year registered as a regular student of the fourth year; 52 were registered as regular students of the third year (the regular students of the present fourth year class now number 53); 73 were registered as regular students of the second year (the regular students of the present third year class now number 63); and 148 were registered as regular students of the first year (the students of the present second year class now number 112); while 95, out of this number, were registered at the beginning of last year as special students.

* In addition, 10 students are repeating the first year.

AGES OF STUDENTS ON ENTRANCE.

Another class of facts which I have deemed it desirable to present relates to the ages of our students upon entrance. I have, therefore, caused the statistics of this subject to be compiled with reference to the regular students of the incoming first year class. The class numbers 187. From these we should except two cases of students of unusual age; viz., one of 23 and one of 24 years. Three cases also fall out, because the ages are not stated. These deductions leave 182 as the number of students whose ages have been made the subject of computation.

The results appear in the following table:—

AGE.			Aggregate No. of Students by 6-mo's groups.	AGE.			Aggregate No. of Students by 6-mo's groups.
Year of Life completed.	Additional Months.	No. of Students with- in each period.		Year of Life completed.	Additional Months.	No. of Students with- in each period.	
16	..	2	..	18	6	7	..
16	1	1	..	18	7	4	..
16	2	2	..	18	8	3	..
16	3	2	..	18	9	5	..
16	4	1	..	18	10	3	..
16	5	3	II	18	11	1	23
16	6	2	..	19	..	6	..
16	7	4	..	19	1	3	..
16	9	6	..	19	2	3	..
16	10	2	..	19	3	2	..
16	11	2	16	19	4	5	..
17	..	6	..	19	5	2	21
17	1	4	..	19	6	1	..
17	2	5	..	19	7	3	..
17	3	6	..	19	8	4	..
17	4	3	24	19	10	2	..
17	6	3	..	19	11	1	11
17	7	4	..	20	..	1	..
17	8	4	..	20	2	3	..
17	9	5	..	20	3	1	..
17	10	2	..	20	5	1	6
17	11	2	20	20	7	2	..
18	..	8	..	20	8	1	3
18	1	11	..	21	1	1	..
18	2	1	..	21	4	1	2
18	3	6	..	21	6	2	..
18	4	8	..	21	10	1	3
18	5	8	42	..	..	..	..

From the foregoing table it appears that the average age of the 182 students taken for this comparison is 218.53 months, or 18 years, 2 months, and 16 days. It appears that precisely one-half (91) of the students taken are of the age of 18 years and 2 months, or under.

It appears that 27 students are between 16 and 17 years of age, and 14 are above 20; leaving 141 between 17 and 20, of whom 44 are between 17 and 18, 65 between 18 and 19, 32 between 19 and 20.

A fact which gives especial importance to these figures is found in the rule this year adopted, and entered for the first time in the catalogue laid before you to-day,—that after September, 1886, no student will be received into the School of Industrial Science who has not attained the age of 17 years. The Faculty believe that not only will the adoption of this rule have a wholesome effect in holding back from entrance into the school scholars who are of too tender and immature an age to take the studies and exercises of the Institute to the best advantage, but that this regulation, as promulgated in the catalogue, will have a certain influence in inducing students and their parents to protract the period of their preparatory studies even beyond the minimum limit thus fixed.

The average age, on entrance, of the class graduating last May, and of the three upper classes at present in the school, is found, when computed on the same basis as the above, (i.e., omitting all students over 22 years of age), to be as follows:—

Class of	Av. Age in Months.	Class of	Av. Age in Months.
1885	220.50	1888	220.66
1886	218.45	1889 (as above) . . .	218.53
1887	218.88		

PROPORTION OF REGULAR AND OF SPECIAL STUDENTS.

Another table which has been prepared exhibits both the absolute number of regular and of special students, as by the catalogue of each successive year, and also the proportion existing between these two classes:—

YEAR.	No. of Regular Students.	No. of Special Students.	Total No. of Students.	PERCENTAGE.	
				Regular.	Special.
1865-66	64	8	72	Per cent. 89	Per cent. 11
1866-67	110	27	137	80	20
1867-68	124	43	167	74	26
1868-69	105	67	172	61	39
1869-70	125	81	206	71	29
1870-71	143	81	224	64	36
1871-72	180	81	261	69	31
1872-73	235	113	348	68	32
1873-74	182	94	276	66	34
1874-75	170	78	248	69	31
1875-76	182	73	255	71	29
1876-77	134	81	215	62	38
1877-78	117	77	194	60	40
1878-79	103	85	188	55	45
1879-80	110	93	203	54	46
1880-81	140	113	253	55	45
1881-82	164	138	302	54	46
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

It will be seen that the proportion of regular students rose from 54 per cent in 1881, to 60 per cent in 1882, to 61 per cent in 1883, to 64 per cent in 1884; while this year it reaches 68 per cent, the actual number of regular students being greater by 47 than last year.

Of the 194 special students, 31 are students taking the two years' partial course in architecture.

The steady increase in the proportion of regular students, recorded above, is gratifying; but this remark needs to be accompanied by the statement, in the nature of a disclaimer, that a certain and not inconsiderable porportion of "specials" will always constitute a desirable element in our body of students.

The system relating to special students performs, in this institution, a somewhat unusual function, which is esteemed of great importance. First, in that, in this way, we are enabled to receive and provide for the wants of many per-

sons whose means or family circumstances, or whose age at the time of entrance, will not permit them to take a regular course. Among such special students have always been found some of our best scholars ; and from this class have gone out many eminently successful engineers, architects, and chemists.

Secondly, in that, in this way, we are able to do what is best to be done in the case of that comparatively small class of young persons whose intellectual aptitudes are so pronounced and peculiar as to disqualify them from taking the whole of any course organized with reference to the needs and abilities of a body of students. By this is not meant that students, generally speaking, should take up only those studies for which they have a distinct taste or fitness. The great majority of students may, consistently with making full use of their special gifts, pursue studies and exercises for which they have a lower, perhaps a much lower, degree of qualification. But it sometimes, it indeed not infrequently happens, that a student of decided abilities in some directions, is deaf, dumb, and blind so far as certain studies are considered. Whatever is addressed to him from such a quarter means absolutely nothing. Sometimes, indeed most commonly, such a disqualification for a whole class of studies or exercises is found in connection with very ordinary abilities ; at other times it is found to consist with the capability for first-rate work in the directions which nature has pointed out ; in instances, it is even compatible with tastes and aptitudes which constitute genius.

To say of all the students of an institution, that, on the penalty of foregoing instruction entirely, they shall take the whole of any one, even of several optional courses, is, in the case of students of the class indicated above, not merely to demand what is a sheer waste of time and strength : it also involves experiences in the study-room and in the class-room which are prejudicial to the student's ambition and self-respect, which inevitably lower his stand-

ard for the performance of duty, and which tend, in the case of all but the strongest minds, to impair intellectual integrity and honesty.

To all the students of this school, the Faculty hold out two inducements to become and remain regular students: first, the degree of the Institute, which is, for professional purposes, of a distinct and constantly increasing value; secondly, the consideration that we can, other things equal, do more in the same time for a regular than for a special student, the former's work being, in the nature of the case, better adjusted, more accurately measured, and subject to more of inspiration and impulse from the teacher and from the class.

After offering the student these two inducements, the Faculty leave it to the determination of himself and of his parents or guardian, whether he shall enter a course leading to the degree of the Institute, or take up studies specially suited to his own needs, tastes, and abilities.

At the same time, the Faculty do not purpose to admit anarchy into the studies and exercises of the Institute. A standing committee of the Faculty is charged with the scrutiny of the attendance papers of all special students, to see that the several studies taken hold a reasonable relation to each other, and that the amount of work involved is fairly adequate to occupy the scholar's time and energies. As to the performance of the work actually undertaken, the requirements are not less severe in the case of special than of regular students.

Thirdly. But perhaps an even more important function which the system of special students performs with us is one which may be called an administrative function. It is the steady purpose of the Faculty, not to confer the degree of the Institute upon any man who has not taken a thoroughly satisfactory course. Merely passing the several successive examinations, grazing every corner, will not answer: the student must have gone through the required studies and exercises with something of liberality, with

something over and to spare. Merely to have done the prescribed work, under the guidance and superintendence of his teachers, will not answer: he must have proved, by sustained thesis work, continued through several months, his ability to do original work, to plan and carry through a professional investigation by himself.

This standard the Faculty have unfalteringly maintained, even through the period of deepest darkness in the history of the Institute. The system adopted for the classification of students enables this to be done with the least possible harshness. On the one hand, the student who has, at any stage in the course, failed to do all that ought to be required of a candidate for a degree is not necessarily thrown out of the school; and, on the other hand, the Faculty are relieved from that painful pressure which rests upon all instructors where the old-fashioned class system is maintained, to allow students, in spite of specific deficiencies, and in spite of a generally low performance of work, to go forward, because it seems cruel to drop them, and put a stop to their scholarly career. In this school, when a student for any reason falls below the standard of what is required, after a fair trial, he becomes a special student, not by vote of the Faculty, but *ipso facto*. He is thereafter permitted to continue in all subjects in which he has done well, and to begin any new study which is dependent on these. Whenever he feels strong enough to put himself again in course for a degree, he is at liberty to present himself, at reasonable intervals, for examination in the matters in which he was found deficient. It is always competent for him to prove, if he can, that he is prepared to resume standing as a regular student. In this way, it often happens that a student who, from deficiencies of early instruction or from natural tardiness of development, could not have kept up with a class, and satisfactorily completed a course in four years, appears, at the end of the fifth year, as a very successful candidate for the degree of the Institute, with the highest promise of usefulness.

THE COURSES OF INSTRUCTION.

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 in 1868. In this table, the term "General Course" will be understood to embrace alike the "Science and Literature" Course of the period 1868-1880, and the Elective and General Courses of the period subsequent.

YEAR.	Civil Engineering.	Mechanical Engineering.	Mining Engineering.	Architecture.	Chemistry.	Metallurgy.	Electrical Engineering.	Natural History.	Physics.	General Courses.	Total.
1868. . . .	6	1	6	..	..	..	..	..	..	I	14
1869. . . .	2	2	..	..	I	..	..	..	..	..	5
1870. . . .	4	2	2	..	I	..	..	..	..	I	10
1871. . . .	8	2	5	..	2	..	..	..	..	..	17
1872. . . .	3	I	5	..	3	..	..	..	..	..	12
1873. . . .	13	I	3	I	7	..	..	..	..	I	26
1874. . . .	10	4	I	I	..	..	..	..	..	2	18
1875. . . .	10	6	6	I	I	..	..	..	I	2	27
1876. . . .	12	9	7	..	5	..	..	I	4	4	43
1877. . . .	12	6	8	4	2	..	..	..	..	..	32
1878. . . .	8	2	2	3	3	..	..	..	..	I	19
1879. . . .	6	8	3	I	3	..	..	..	..	..	23
1880. . . .	3	..	3	..	I	..	..	I	I	..	8
1881. . . .	3	5	6	3	8	..	..	..	..	I	28
1882. . . .	2	5	5	3	6	..	..	..	..	I	24
1883. . . .	3	7	4	I	3	..	..	..	..	..	18
1884. . . .	5	6	13	..	12	..	..	..	..	..	36
1885. . . .	4	6	8	2	4	..	2	..	..	I	27
Total . . .	114	73	87	20	62	I	2	4	7	17	387
Deduct names counted twice											2
											385

In the following table appears the distribution of the 228 regular students of the three upper classes among the several courses : —

YEAR.	Civil Engineering.	Mechanical Engineering.	Mining Engineering and Metallurgy.	Architecture.	Chemistry.	Electrical Engineering.	Natural History.	Physics.	General Course.	Total.
4th year class,	11	19	8	1	6	7	1	..	..	53
3d " "	11	19	10	2	5	11	1	1	3	63
2d " "	22	36	8	7	12	23	2	..	2	112
Total . . .	44	74	26	10	23	41	4	1	5	228

THE WORK OF SPECIAL STUDENTS.

The 194 special students in the School of Industrial Science cannot be classified systematically; but the following table exhibits the number of special students pursuing each particular branch of study, according to the attendance papers filed by them, and approved by the Faculty:—

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

Architecture	40	German	85
Applied Mechanics	44	Mathematics	97
Chemistry	59	Mechanical Engineering	52
Civil Engineering	23	Military Drill	9
Mechanical Drawing	18	Mining and Metallurgy	20
Descriptive Geometry	30	Physics	87
English	72	Shop Work	60
French	42		
Geology	23		
Total number of entries, by special students			761
Total number of special students			194
Average number of entries			3.9

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

	First Year.	Second Year.	Third Year.	Fourth Year.	Total.
Mathematics	208	148	87	9	452
Chemistry	217	35	32	19	303
English	197	133	67	..	397
French	216	..	..	..	216
Physics . . . . .	..	159	92	17	268
German . . . . .	..	153	105	5	263
Shopwork * . . . .	..	93	44	28	165

A still further increase of the instructing staff of the Institute has been required during the year.

The number of instructors of all grades, excluding those persons who are announced as lecturers for the year, is 62 against 57 last year. This increase has been mainly due to the very high specialization of work in the departments of Mechanical and Electrical Engineering, and to the great extension of drawing-room and laboratory practice in all departments.

The number of professors in the school is now 14; of associate professors, 6; of assistant professors, 7; of instructors, 17; of assistants, 18.

The following table shows the number of teachers of each recognized grade in each year since the foundation of the school:—

* Exclusive, of course, of the students of the School of Mechanic Arts. The corresponding total last year was 124.

YEAR.	Professors.	Associate Professors.	Assistant Professors.	Instructors.	Assistants.	Total.
1865-66 . . .	10	..	..	.	..	10
1866-67 . . .	12	..	..	2	..	14
1867-68 . . .	12	..	1	2	2	17
1868-69 . . .	13	..	..	6	1	20
1869-70 . . .	16	..	1	6	2	25
1870-71 . . .	18	..	2	7	5	32
1871-72 . . .	21	..	2	11	1	35
1872-73 . . .	23	..	2	9	1	35
1873-74 . . .	20	..	3	10	4	37
1874-75 . . .	20	..	3	7	3	33
1875-76 . . .	23	..	..	6	8	37
1876-77 . . .	21	..	..	4	10	35
1877-78 . . .	20	..	..	3	14	37
1878-79 . . .	18	..	..	7	12	37
1879-80 . . .	16	..	..	7	8	31
1880-81 . . .	15	..	2	6	7	30
1881-82 . . .	17	..	3	6	11	37
1882-83 . . .	16	..	3	10	11	40
1883-84 . . .	15	..	8	15	10	48
1884-85 . . .	14	3	11	15	14	57
1885-86 . . .	14	6	7	17	18	62

Among the changes of the year has been one which calls for more than a passing notice. Professor Charles H. Wing has, after ten years of service, resigned the chair of analytical chemistry, at the imperative demands of private interests. The members of the corporation have no need to be told how great has been the contribution made by Professor Wing to the upbuilding of this School of Industrial Science; but I desire to put upon record my own deep sense of the value of his services. Few, indeed, of those who have been connected, in any capacity, with the Institute of Technology since its foundation in 1865, have done more to give it direction and impulse. His soundness of judgment, thoroughness of knowledge, and steadiness of will have not only made him eminently useful in his own department of instruction, but have constituted him one of the most trustworthy of advisers in regard to the general policy of the school and upon the multitudinous questions of detail arising in the course of administration.

Upon the resignation of Professor Wing, Professor Thomas M. Drown was appointed to the chair of analytical chemistry. He accepted the appointment, and entered on his duties at the opening of the school year.

Mr. Drown received the degree of Bachelor of Arts, in 1859, from the Philadelphia High School; and, in 1862, the diploma of Doctor of Medicine from the University of Pennsylvania. During 1862-63 he pursued advanced studies in the Sheffield Scientific School at New Haven; during 1863-65 he studied under Professor Wolcott Gibbs in the Lawrence Scientific School of Harvard University; during 1865-66 he was a student in the Freiberg Mining Academy of Saxony; during 1866-68 he studied under Bunsen in Heidelberg. During the academic year 1869-70, he was instructor in metallurgy in the Lawrence Scientific School. In 1871 he became Secretary of the American Institute of Mining Engineers, in which office he continued until 1873. In 1875 he was appointed professor of analytical chemistry in Lafayette College, Easton, Penn., resigning therefrom in 1883.

During the year Assistant Professors Holman, Wells, and Norton have been deservedly advanced to the grade of Associate Professors in their several departments.

Early in the school year, Assistant Professor Charles H. Fisher was compelled, by ill-health, to resign from the department of mechanical engineering; Assistant Professor Peabody has, in consequence, been transferred from the department of applied mechanics to that of mechanical engineering, with the title of Assistant Professor of Steam Engineering; and Mr. Jerome Sondericker, lately of the Illinois Industrial University, was appointed instructor to assist Professor Lanza in the instruction in applied mechanics.

At the opening of the present school year, Dr. Joseph J. Skinner, formerly of the Sheffield Scientific School of New Haven, was appointed instructor in mathematics; and Mr. William Cook, formerly of Harvard University, was ap-

pointed instructor in modern languages. These appointments have greatly strengthened the instructing-staff in the two departments concerned.

LABORATORIES.

The alterations and additions effected among the laboratories of the school during the year will seem slight in comparison with the great and almost revolutionary changes of recent years. The increase of students in the department of industrial chemistry, under the vigorous administration of Associate Professor Norton, has made necessary an addition to the laboratory of that department, which has been secured at the expense of the chemical supply-room. The space thus obtained has been utilized as a dyeing-room, and has been fitted up with kettles, water-baths, and various working-models of machines used in this industry.

The large suite of rooms, occupied since 1883, in friendly partnership by the laboratories of applied mechanics and of mechanical engineering, both under the charge of Professor Lanza, were, during the summer, still further equipped with a great variety of new apparatus and machinery, fully doubling the capacity of these laboratories for the instruction of students. A new machine for testing the strength of materials by tensile and compressive strains, a machine for making time-tests of timber, an additional condenser, a mercury column, a six-inch turbine, an additional friction-brake, and a suite of apparatus for testing the friction of belting and the strain upon shafting, have been added to this laboratory, which is now in thorough working-order, with a wealth of appliances for practical tests and scientific investigations in this most interesting department of instruction, which already contains one-third of the students of the three upper classes.

During my trip to France, in June of the last summer, I enjoyed the privilege of visiting several of the technical and professional schools of Paris ; and, while subsequently

in England, I visited the Universities of Cambridge, Edinburgh, Glasgow, and St. Andrew's, the University Colleges of Bristol and Dundee, the new Science College of Yorkshire, in Leeds, the Finsbury Technical College, the Royal School of Mines, and the new City and Guilds Institute at South Kensington, London. During the past few years enormous expenditures have been made towards the equipment of institutions for scientific and technical instruction in the United Kingdom; and this work, so long delayed, is still proceeding with great vigor under most enlightened direction. To say that I saw no laboratories, whether of chemistry, of physics, or of mechanics, which are equal to our own in capacity or appointments, is not incompatible with the remark that I derived much in the way of instruction from visiting these institutions, and much in the way of inspiration from conference with the able and learned scholars who are shaping "the new education" abroad. Of all that I saw, that which I most admired and most coveted for our own country and for this our own school was the Industrial Museum in the Rue St. Martin, connected with the École Centrale of Paris. May we not hope that, at some not distant date, the munificence of the citizens of Boston will enable the Institute of Technology to place, in an equally striking and picturesque arrangement, the complete history of American invention and American industry; to exhibit in spacious and well-lighted halls, in orderly succession, in their choicest forms, the machinery, the processes, and the products of every branch of manufacture, — alike for the advantage of our own students, and for the entertainment and instruction of the residents and the visitors of this beautiful city?

During the summer, also, Dr. Williams, of the corporation, visited Zurich, Munich, and other seats of chemical instruction, with a view to studying the problem of instruction in industrial chemistry, and obtaining suggestions for the further equipment of that portion of our own laboratories. I cannot doubt that the service of the Institute,

on this side, will derive immediate benefit from these observations and studies of Dr. Williams.

Of the deportment of the scholars of the Institute during the year covered by the report now offered ; of the respect paid to the few and simple rules of the school ; of the attention given to the prescribed studies and exercises ; of the progress made in scientific acquirements, in professional accomplishments, and in manly character ; of the relations between teacher and pupil here ; of the general spirit pervading the institution,—I have nothing to say but what is gratifying in the present and encouraging for the future. It is one of the felicities of an instructor in this school, that his duty calls him to deal with young men who, in general, appreciate acutely the privileges which the sacrifices of their friends have secured for them ; who will not remain content with a low standing, and a shabby performance of prescribed tasks ; who are laying the foundations of future success by doing present duties faithfully and well ; who come hither to work, and who, in all but a comparatively insignificant number of instances, do work as hard and as long as their teachers would desire ; among whom the ambition for display, the taste for frivolity, the aptitude for vicious indulgences, are at the minimum, and whose dominant sentiment instinctively prescribes the right and outlaws the wrong. That excellent teacher who has just left the chair of analytical chemistry has told me, that, in his ten years of service, he has never had a dozen "black sheep" in his laboratory, — men whom in spite of faults and failings he could not respect, and of whom he felt reluctant to be the teacher. That was a noble tribute for a teacher whose own ideal of character and conduct was so high, to pay to a body of students so large and so variously composed. Of its strict truthfulness I entertain no doubt. There is something in the atmosphere of the place ; in the character of the studies and exercises pursued ; in the distinctness with which the students see the purpose and object of those studies and exercises, as bearing upon their

own success and happiness in life ; in the close and familiar contact of teacher and student, at the bench, across the table, around the machine ; doubtless, also, in the class of students who are attracted to the school, — which makes the work of instruction here singularly agreeable and inspiring.

I cannot close this paper without adverting to the necessity, so strongly insisted upon in my last report, which exists for large additional endowments to secure the future of this school ; to enlarge its means of present usefulness ; and, both through the reduction of the prescribed tuition-fees and through the establishment of a certain number of free scholarships, to bring the advantages of the Institute of Technology within the reach of a larger number of the youth of the Commonwealth and of the country.

All of which is respectfully submitted.

FRANCIS A. WALKER, *President.*