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PRESIDENT'S REPORT

JANUARY

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Institute of Technology  
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REPORTS  
OF THE  
PRESIDENT AND TREASURER

PRESENTED AT THE DECEMBER MEETING OF THE CORPORATION

JANUARY, 1912

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<sup>1</sup>Address correspondence to Professor A. L. Merrill, Secretary of the Faculty. (See page 14).

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## Report of the President.

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TO THE MEMBERS OF THE CORPORATION:

I beg to submit the following report on the affairs of the Institute during the year, appending, as usual, reports from other administrative officers with reference to the work of their special departments. The year has been remarkable for conspicuous losses and gains.

### LOSSES DURING THE YEAR.

Foremost amongst the losses is that of Mrs. Rogers, whose death in May broke a link with the very beginnings of the Institute. Throughout her long life, she was catholic in her appreciation of good causes, but from the foundation of the Institute, the interests of Technology were peculiarly her own. Her devotion to it was part of her loyalty to the memory of her husband, but it was greatly stimulated by her personal sympathy with struggling youth and her understanding of the importance of the Institute's work to the well-being of society. I need hardly remind you that Mrs. Rogers was a woman of quite exceptional vigor of mind, as well as charm of character and manner. Her memory will be cherished by every Institute man, and by all others who had the good fortune to come within the range of her influence.

Your Corporation itself has suffered a great loss by the death of Mr. Nathaniel Thayer, whose term of service as one of its members was of the longest, and who, throughout that long period, proved himself a staunch friend and generous benefactor of the Institute. During the year died also

Dr. Charles G. Weld, who, although not a member of this Corporation at the time of his death, served on it for ten years and continued his interest in the Institute unabated until his death. Dr. Weld was especially interested in the work of the Department of Naval Architecture, and he showed that interest in the most practical way by keeping in close touch with its activities, suggesting new fields of endeavor, and generously supplying the funds required to carry out plans that seemed to him good. The loss of his interest and support will be keenly felt by the Department and it is particularly to be regretted that the important researches for which he had made partial provision will have to be abandoned for lack of means to continue them.

The instructing staff has also suffered conspicuous losses by the retirement of Professors Lanza, Chandler and Schwamb and by the death of Mrs. Richards. Professor Lanza retires on a pension with the title of Professor Emeritus, after forty years of service. Throughout that long period, he has shown himself absolutely devoted to the interests of the Institute, to which he has rendered a memorable service in the building up of one of the most important departments, that of Mechanical Engineering. Professor Chandler, who has retired on a pension from the Carnegie Foundation, has also well earned the title of Professor Emeritus. He has been head of the Department of Architecture for twenty-three years, and leaves the oldest school of Architecture in the country at the highest level of its efficiency and reputation. He retires with the respect and love of all who appreciate the singular genuineness and sincerity of his character and his zeal for the advancement of Architecture throughout the country. Among the many evidences of that appreciation, one that made a special appeal to him, was the announcement by the Boston Society of Architects that it proposed to establish a fund for the annual award of a Francis Ward

Chandler prize to a postgraduate student of Architecture at the Institute.

Professors Lanza and Chandler have given up their active duties at an age when retirement is normal. Professor Schwamb, on the other hand, has unfortunately felt it necessary to retire on the ground of physical disability, but for which many more years of service might have been expected of him. He has done excellent work in directing the Department of Mechanic Arts, and has fully maintained the very high standard of devotion to the Institute that has been set by the senior members of the Faculty.

In Mrs. Richards, we have lost a great teacher and a great worker in great causes. In his report to the Corporation in 1883, President Walker in making some references to the education of women, recalled the fact that as early as 1867 among the lectures open equally to both sexes were certain courses in Chemistry given by instructors at the Institute,—Professors Storer and Charles W. Eliot. He went on to describe the improved facilities that the Institute had just provided for the instruction of women and added “The completion of these laboratories of necessity supersedes the separate laboratory which had been so long maintained, largely through the zeal and devotion of Mrs. Ellen H. Richards, herself a regular graduate of the Institute, who has for seven years given instruction several hours of each day, *without any compensation for her services.*” Service of that kind, begun thirty-four years ago and continued with unflagging zeal until the end, was characteristic of the spirit that animated her, not only in her relations with the Institute, but in all the other fields of her activities. She was especially interested in the betterment of living conditions for all through the application of scientific methods to the problems of household management, and she was a tireless worker in the cause of women’s education. She was the guide, philosopher and friend to every woman studying at the Institute. There are very

few of these to-day, and there is little prospect of an increase in the numbers, as the scientific education in women's colleges continues to improve, and as women hesitate to enter the professions to which the Institute's courses are designed to lead. However, the Institute still refrains from imposing any artificial barriers to those women who wish to profit by its courses, and it is not likely to forget what it owes to the devotion of women of whom Mrs. Richards was a type. It is gratifying to know that her friends are endeavoring to establish a permanent memorial of her work at the Institute in a form that would undoubtedly have commended itself to her judgment.

#### GAINS DURING THE YEAR.

The great personal losses to which reference has just been made have been offset by very conspicuous gains. These gains have not been all material. Indeed, I should account as by far the greatest gain of all the change that within the year has come over the spirit of the friends of Technology. The feeling of uncertainty on the part of many, and even of despondency on the part of a few, has completely passed away. The main causes of the darker mood were an appreciation of the heavy financial burden involved in maintaining the Institute in its position of leadership, and a lack of appreciation of the practical value of the loyalty of the alumni and of the public good-will towards the Institute. A mere enumeration of the additions to the Institute's resources, announced during the year will show that there is a substantial basis for the change of outlook. The grant of \$1,000,000 by the Commonwealth, the bequest of nearly \$500,000 from Mrs. Rogers, of over \$500,000 from Mr. Greene, the promise of \$500,000 from Mr. du Pont, the bequest of \$50,000 from Mr. Thayer, of nearly \$100,000 from Mrs. Frances M. Perkins, the gifts and bequests set forth on the first page of the Treasurer's

report, added to those from alumni for the purchase and equipment of the Summer School of Civil Engineering, make a grand total of nearly two and three quarters million dollars to be confidently reckoned on as accruing in the near future.

#### GRANT FROM THE COMMONWEALTH.

In my last report I directed your attention to the fact that we were approaching the close of the period for which our annual appropriation of \$25,000 had been provided by the Legislature, and in view of the current deficit and the steady rise in the cost of maintaining the Institute, I urged concerted action with the object of securing an increase of state aid during the next decade. In a supplementary argument, I estimated that an increase of \$75,000, in the state appropriation (making a total of \$100,000), would be necessary to maintain things at their present level, leaving it for private benefactors to supply the funds needed for improvements. You will observe from the Treasurer's report, that, but for gifts and bequests, there would have been a deficit this year of \$76,898.79. At its last annual meeting your Corporation approved of the presentation of a petition to the Legislature asking for an appropriation of \$100,000 per annum for the next ten years, and empowered a committee to take such steps as it deemed expedient to secure the success of this petition. The Committee consisted of Messrs. Thomas L. Livermore, Robert S. Peabody, Lucius Tuttle, Frank W. Rollins and the President, Secretary and Treasurer. It was most fortunate in securing the co-operation of a committee of the alumni presided over by Mr. James W. Rollins and the extraordinary energy and enthusiasm displayed by that committee must have contributed very largely to the success of the issue. The campaign that it inaugurated was necessarily a protracted one, and its most gratifying

feature (apart from the final outcome) was the wealth of evidence that it revealed of widespread appreciation of the great service that the Institute has rendered to the Commonwealth, and of determination on the part of the people to maintain its educational standards at the highest. This good-will was reflected in the Press representing all shades of political opinion, and the resolve finally agreed upon passed both branches of the Legislature with practically unanimous consent. It provides that \$100,000 be paid annually to the Institute for the next ten years, the fulfilment of the condition that by gifts or bequests a million dollars be added to the funds of the Institute within five years of the approval of the resolve being already assured. In consideration of this annual payment and during its continuance, the Institute is to maintain eighty free scholarships, two being allotted to each senatorial district. The maintenance of such scholarships accords with a well established and thoroughly sound educational policy, but of course it diminishes very considerably the direct financial benefit that the Institute derives from this grant from the State.

#### BEQUESTS OF MRS. ROGERS AND MR. GREENE.

A few days after the approval by His Excellency the Governor, of this grant from the State, the publication of Mrs. Rogers' will revealed the fact that she had left nearly the whole of her property to the Institute. Her example of whole-hearted devotion to the advancement of Technology can not fail to have a stimulating effect on all who wish to see the fruition of Rogers' ideas, and especially on the alumni of the Institute, who have so long paid the tribute of respect to the memory of its founder, and to Mrs. Rogers herself. It is gratifying to observe that Mrs. Rogers displayed her confidence in your Corporation by leaving every-

thing to this body without conditions or restrictions of any kind as to its use.

About the same time, it became known that the late Mr. Francis B. Greene had bequeathed a very valuable estate to the Institute in trust for the assistance of poor and meritorious students therein. It is left to the discretion of your Corporation to determine what form such assistance is to take. Aid may be granted by way of scholarships towards the payment of tuition fees, but it is worthy of serious consideration whether it would not be better in some cases to make partial provision for satisfactory board and lodgings. Experience of the actual conditions here shows that young men often find it much more difficult to get help towards the payment of living expenses than of tuition fees, and in not a few cases they are driven to an extreme of economy that is detrimental to their health and well-being.

Mr. Greene's large addition to the funds that are available for scholarship purposes emphasizes the fact that these funds form a very considerable proportion of the income-producing property of the Institute. It is not as thoroughly realized as it should be that such funds do not directly help the Institute at all, great as is their value to the students aided thereby. The Institute has no difficulty in attracting as many students as it can deal with satisfactorily, and benefactors, who found scholarships, seldom seem to grasp the simple fact that every student is a financial burden on the Institute, and costs it a great deal more than it receives by way of tuition fee. Ten years ago, the tuition fee was \$200, and the cost per student \$363, so that the loss on each was \$163. Meanwhile the fee has been raised to \$250, but the cost of education has grown more rapidly. In the decade 1900 to 1910, the total amount paid in salaries to the instructing staff increased 70 per cent. and the total annual expenses rose from \$377,423 to \$615,571, an increase of 63 per cent. This brought the cost per student up to

\$489 per annum making an excess of \$239 over the tuition fee. The maintenance of such a condition is made possible by the endowments of the Institute, but every benefactor who founds a scholarship here takes something from the gift of others who have imposed no restrictions on what they have given. In view of this, it has sometimes been suggested that the Institute should not accept the trust of a scholarship fund, unless the founder follows the practice of the Commonwealth and adds to the general endowment when providing for scholarships. I do not advocate such a departure from the traditional policy, but I commend to your consideration the question whether some of the burden now borne by the Institute ought not to be transferred to the shoulders of those who benefit directly by grants from the scholarship funds. This might be done by imposing on the recipients of scholarships an obligation to reimburse the Institute after a reasonable lapse of time.

#### **MR. T. COLEMAN DU PONT'S GIFT AND THE SITE PROBLEM.**

These two matters are mentioned together because the site problem that has perplexed your Corporation for so many years was practically solved by Mr. du Pont's generous offer to contribute one-half million dollars on condition that an additional one and one-half million dollars be raised during the next five years. The difficulties of the site problem being mainly financial were greatly increased by the fact that two heavy burdens were imposed on the friends of the Institute at the same time. One of these was to obtain money to buy a site and rebuild the Institute, and the other was to add very largely to the endowment fund, so as to prevent the recurrence of serious deficits. It seemed natural to attack these problems separately and successively. This policy however was met by the difficulty that many feared that a campaign for physical development would dry up the sources of supply for current



expenditure, and so endanger the educational standards of the Institute, whilst others saw no hope of obtaining any large additions to endowment funds until the future location of the Institute was definitely settled. Under these circumstances it was necessary to take the two problems together. Mr. du Pont's offer was large enough to demonstrate that the site problem could be solved, and it was opportunely timed so as to convince the Legislature that the Institute meant to move and should be helped in the matter of endowment until it had time to set its new house in order. Immediately after the grant from the State was secured, your Corporation entrusted me with the appointment of a committee of five with power to purchase the new site. That committee consists of Messrs. Wigglesworth, Hart, Webster, Everett Morss and the President. At your last meeting it reported that it had selected a tract of nearly fifty acres in Cambridge on the Charles River embankment, having a frontage of 1760 feet to the Esplanade and 1150 feet to Massachusetts Avenue, and that it had agreed to purchase this tract provided certain conditions were fulfilled and certain streets closed. Since that time, the question of the closing of these streets has come before the city government, and although it has not yet been formally settled, it is understood that the Committee to whom the matter was referred has reported favorably. In view of this, as well as of the general appreciation of the enormous advantages that Cambridge would derive from the location of the Institute on this particular tract, and of the fact that the city government itself joined in the chorus of invitation to secure this site, there seems little doubt that the matter will be satisfactorily arranged in the near future.

## SUMMER CAMP FOR CIVIL ENGINEERING.

The heart of a great city offers many advantages as the location of a school of applied science, but these are offset by a few disadvantages. One of these is that it presents rather meagre opportunities for effective instruction in surveying and allied branches of the art of a civil engineer. It has become increasingly difficult to surmount the obstacles thus presented in a satisfactory way. At the same time there has been a continuous pressure to load the curriculum and make it more and more difficult to cover the ground satisfactorily in the time allotted. With the object of meeting this difficulty a five-year course has been offered for some time as an alternative to the more regular course of four years. It was not, however, anticipated that many would choose this alternative, as it was realized that the majority of the students at the Institute are men who feel that they must not delay unduly their entrance into practical life. At the same time, the tendency to add somewhat to the old curriculum is well-nigh irresistible, so that some addition to the period of study within the four years is almost inevitable. Recognizing this, Professor Swain, several years ago, urged the establishment of a summer camp for certain branches of Civil Engineering. The Faculty carefully considered the whole subject and recommended that instruction in surveying be concentrated into a portion of a single summer, and that the time thus set free during the winter be devoted mainly to a more thorough study of some of the fundamental subjects of instruction. This plan has been adopted and will go into effect next summer. The selection of a site for the summer camp and the provision for its proper equipment have been due to the activity of a committee of the Alumni Association, and particularly to the generosity of two of the alumni; one of these, who prefers to remain anonymous, has purchased the land and offered to equip the camp; the

other, Mr. Charles W. Eaton, '85, has given \$10,000 towards the construction of the buildings. The site selected is most admirably adapted for the purpose. It consists of a tract of land over seven hundred acres in extent, with a frontage of three miles on one of the most beautiful lakes in Maine. The land, which is wooded in parts, is well-suited for practical instruction in surveying, while stream measurements can be carried on in the river that drains the lake, and tidal observations on the sea which is only three or four miles away. Work has already begun upon the buildings, which embody the latest ideas in camp construction, from the designs of Messrs. Kilham and Hopkins. There can be no doubt that the establishment of this summer school greatly improves our facilities for instruction. Not the least of its advantages is the opportunity that it will present for social intercourse amongst the students, under conditions that are well-nigh ideal.

#### CONGRESS OF TECHNOLOGY.

The charter of the Institute was signed by Governor Andrew on the tenth of April, 1861. To celebrate the fiftieth anniversary of this event, a Congress of Technology was held in Boston, and to this Congress representatives of industries throughout the country were invited to listen to and discuss papers presented by alumni of the Institute and members of its Faculty. These papers dealt with various phases of the relations between the Institute's activities and the industrial efficiency of the nation. They have recently been collected and published under the title "Technology and Industrial Efficiency." The success of the Congress itself surpassed even the expectations of its promoters both as regards the variety and importance of the papers presented, and the great interest shown by representatives of industry from all parts of the country. The Proceedings closed with a banquet in Symphony Hall

which was remarkable for the enthusiasm displayed for the welfare and advancement of the Institute. It is gratifying to be able to add that the whole proceedings cost the Institute nothing, as all expenses were defrayed by generous subscriptions from its friends.

#### INTERNAL AFFAIRS.

With regard to internal affairs, reference has already been made to the loss sustained by the instructing staff due to the resignations of Professors Lanza, Chandler and Schwamb. In Professor Lanza's place, Professor Edward F. Miller has been made Acting-Head of the Department of Mechanical Engineering, and has thrown himself into the work of its reorganization with characteristic energy and enthusiasm. Temporary arrangements have been made for carrying on the work of Professor Chandler. The teaching has been entrusted to special lecturers and the administrative duties have been undertaken by Professor William H. Lawrence, whose experience and temperament qualify him admirably for their performance. Professor Schwamb had, for many years, devoted his energies to directing and developing the important work in Mechanic Arts, in which the Institute was one of the first in this country to give systematic instruction. Since his retirement, it has been deemed expedient to associate this Department more closely with that of Mechanical Engineering, Professor Park of that Department having the care of its immediate direction. In an appendix to this report Professor Miller sets forth the changes that are being effected in the course of Mechanical Engineering. Although the benefit of practical acquaintance with certain mechanic arts is as fully appreciated as before, it is felt that the object sought can be reached if less time is devoted to Forging, Chipping and Filing, and allied operations than has been the practice heretofore. At the other end of the

course, the changes suggested are along the lines of discouragement of too early specializations. Narrower and narrower specialization is of course an inevitable consequence of the advance of science and its operation in the field of practice is reflected in the schools in the form of a steady pressure to devote more time to special branches. We should not, in my judgment, yield too readily to such pressure, and indeed, I would rather see our various courses brought closer together than farther apart.

I have not yet exhausted the changes in the head-ship of departments, for Professor C. Frank Allen has asked to be relieved of his administrative duties in connection with the Department of Civil Engineering. Professor Allen undertook those duties only a short time ago, on the retirement of Professor Swain. He has performed them with tact and discretion, but he has been relieved at his own request in order that he may devote himself more fully to the task of instruction and have some leisure for the literary work in which he is interested. Professor Charles M. Spofford has been placed in charge of the Department of Civil and Sanitary Engineering. Professor Spofford is a distinguished graduate of the Institute, who, after serving on its instructing staff for some years, gained considerable experience both in teaching and practice elsewhere, and returned two years ago as Hayward Professor of Civil Engineering. I am confident that under his able guidance, this important Department will be maintained at a high level of efficiency. Another change that calls for comment, although it is only a nominal one, is the change in the title of the Department of Biology. It was felt that this title did not properly indicate the fact that the biological studies in the Department were mainly directed to the discussion of problems connected with the betterment of the public health. In this field, Professor Sedgwick, and the able men that he has drawn around him, have done epoch-making work. Their contributions to the solution

of the problems of public health are known and appreciated throughout the country and beyond its borders, and, as it is mainly in this field that their influence is felt, it seems reasonable to give to this Department the title of the Department of Biology and Public Health.

The Registrar's report gives the usual information with regard to the students. There are fifty-seven more students than last year, the total number 1566 being the largest in the history of the Institute, except for the record in 1902, a year which was rendered abnormal by the change in tuition fees and the conditions of entrance. There is no marked change in the distribution of the students with respect to their origin, all parts of the Union being represented in practically the same proportions as before. The students from other colleges continue to form a large section of the student body; every fourth man at the Institute is a college man and more than two hundred of them are college graduates. No serious difficulty is presented in fitting the courses of these men into the curriculum, nor is there any marked difference between their standing and that of the more regular students. The health of the students continues to improve with their length of stay at the Institute, indicating that hard work agrees with them physically. The proportion of illnesses to the number of students in the different years can be ascertained from the report of the Dean, whence it appears that during the year the percentage of illness amongst the first, second, third, fourth and fifth year students was 31, 13, 12, 6 and 0 respectively.

#### OUTLOOK FOR THE FUTURE.

The outlook for the future is distinctly bright. There is a great work to be done and that work is full of interest and of inspiration for all who appreciate its importance and realize how much the welfare of the future depends on the efforts of to-day. The educational problem before us is

relatively simple, as the lines of progress are clearly defined by past successes. Improvements are constantly suggesting themselves and our rate of advance would of course be much more rapid if our financial resources were greater. Take, as a single example, the growth of what may be called departmental research. The spirit of research is of course the very life of a scientific institution, and from the day of the foundation of the Institute, a very large amount of important research has been carried on here by graduate students and members of the instructing staff. A more recent development has been the organization of departments for research purposes, the association of a group of individuals within a department for the purpose of attacking collectively the practical problems of industrial life. Thus the Department of Electrical Engineering is investigating the problem of the improvement of electric vehicles for traction purposes, that of Naval Architecture has conducted important researches with reference to the resistance and propulsion of ships, while the activities of the research departments of Public Health, Physical Chemistry and Applied Chemistry cover a great variety of practical problems some of which are set forth in the reports of the heads of these departments. Most of these problems arise out of the actual difficulties of our industrial life and their number and importance has grown with such rapidity that to-day the Institute could very easily treble the size of its research staff, if the necessary space and funds were available. There can be no question as to the importance of this branch of our activities. We have often been reminded of the fact that it was from the research laboratories of Germany that the men went forth who revolutionized the industry of that nation. It is perhaps more to the point to note that our own country is awakening to its needs and our manufacturers are clamoring for men competent to conduct researches, while the supply of such men is far too meagre to meet the demand.

In an article on "Research as a Financial Asset" contributed to the proceedings of the Congress of Technology, a writer who is in a position to speak with authority pointed out that as the result of researches during the last decade a saving of \$240,000,000 per annum had been effected in the nation's bill for lighting. This is not far short of the million dollars a day of which we have heard in another connection, the difference being that these savings have actually been made, and are not merely speculative. At the same time, it should be noted that such savings represent only a fraction of what may reasonably be expected in the future, even in this single detail of our expenditure. Our task is to train men to apply the method and the spirit that have brought about these improvements to every phase of our industrial life.

Closely allied with the strictly educational problems that lie before us is the problem of re-building the Institute in the right way. To do effective work, we must have proper facilities and we can not have such facilities without most careful study of the needs of to-day and some prevision of the demands of to-morrow. No country in the world has spent money more freely on buildings for educational purposes, but unfortunately much of the expenditure has been wasted. We must profit by the experiences of others and fulfil our duty to the community that supplies the means by putting up buildings that are models of economy and of convenience. These buildings must, of course, be worthy of a great institution of learning, and if they are in Cambridge, they must rise to the level of the great architectural possibilities that the riverbank site presents. It is to be hoped, however, that the desired results can be obtained with buildings that are classic in their simplicity and in their freedom from unnecessary ornament. To make provision for the building of this new Technology is the chief problem that immediately confronts your Corporation. The only serious difficulty is the financial



one, but I have no doubt that the large sum of money needed will be forthcoming if only every member really puts his shoulder to the wheel to set things moving as they should. For now that half a century of experience has so amply demonstrated the usefulness of the Institute, it is possible to repeat without any misgiving the statement of President Rogers when making his first appeal for public support. "I am sure," he said, "that I speak from no impulse of mere enthusiasm when I say that this new undertaking presents an opportunity of practical beneficence in connection with education which is not only peculiar, but without precedent in this country. My experience as a teacher and my reflections on the needs and means of industrial instruction assure me that this enterprise, when fully understood, must command the liberal sympathy of those who aim to make their generosity fruitful in substantial and enduring public good."

RICHARD C. MACLAURIN.

## Reports of Administrative Officers.

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### REPORT OF THE SECRETARY OF THE FACULTY.

Few questions beyond those of the usual routine of business have been presented to the Faculty during this year.

There have been certain changes in the course schemes, the most notable of which is the addition of a half year of scientific German in the first term of the second year in Courses I, III and XI. This has been made possible by the transfer of Surveying to the Summer School, which goes into effect next summer. Changes in the Course in Mechanical Engineering are at present before the Faculty, which also include this additional half year of German.

The constantly increasing number of foreign students has led to the appointment of a standing committee to which foreign students may be referred for advice in regard to their courses of study at the Institute. Many of these students come to us poorly prepared in English, and the question of the English requirement for those who may become candidates for our degree has been considered. The Faculty has adopted the following plan: "Students bred in a foreign tongue may receive special instruction in English, and have this English treated and counted as its entrance French or German in the case of English speaking students provided that they have taken, or do take, in their own language a course of a grade fully equivalent to our first year English."

In June, 1911, the Faculty recommended one student for the degree of Doctor of Philosophy, one for the degree of Doctor of Engineering, twenty for the degree of Master of

Science and two hundred and thirty-one for the degree of Bachelor of Science. One of the latter took his degree in both Mechanical and Electrical Engineering.

There were admitted to the Institute in November, 1911, one hundred and sixty-six new students who had attended other colleges for one year or longer. Of these seventy have already received the Bachelor's degree from the college previously attended.

A. L. MERRILL,  
*Secretary of the Faculty.*

### REPORT OF THE DEAN.

It is gratifying to note that the recent efforts of the Alumni and undergraduates to improve the conditions of social life at the Institute are beginning to show results, and there is little doubt but that students of the Institute are now living in a more helpful social environment than ever before. The student organizations are managed more efficiently every year and the upper class men, generally, are taking their responsibilities more seriously. The Institute Committee, the Finance Committee, and the Advisory Boards, are all working to make the so-called "student activities" furnish good business training to the men engaged in them.

The book called, "Concerning the Massachusetts Institute of Technology," published by undergraduates, has done much to make students, Alumni, and Faculty, understand better the problems of student life. A new edition of this book, revised and brought up to date, is now being contemplated.

The students of the Institute are worthy of much praise for the way in which they have taken hold of some of the problems which are matters for Faculty action in many colleges. At the Institute there has never been a Faculty Committee on Athletic Sports, or one to consider the

questions of student life, and responsibility in these matters has been thrown on the individual students. They have been obliged to work out their own problems, with the assistance and advice of older men it may be, but not under direct Faculty compulsion. They have organized a complete system of undergraduate government, and this organization is awakening the interest of students in other technological schools and colleges. The Dean's Office is in receipt of many letters from colleges and technical schools asking for information about the government of student life at the Institute. I can truthfully say that the desire to improve conditions here is nearly universal among our men. The action taken by the second year classes during the last few years in eliminating the foolish and dangerous features from the class contests, is a noticeable example of this spirit.

Our students now make a special effort to bring new students, as early as possible, into touch with Institute affairs. For instance, at the beginning of the year the Walker Club gives an informal reception to all new men coming from other colleges; the Southern Club entertains all new students from the South; both of these meetings being held at the Technology Club. During the first week the Technology Christian Association holds a reception for all first year students at the Union, and "The Tech," the student paper, organizes a dinner for these men at the same place. The Cosmopolitan Club also gives an informal reception to all men from foreign countries.

The Union is, of course, the centre and forum for student life. The management last year was in the hands of three committees. The House Committee, Mr. Oliver D. Powell, Chairman, had special charge of the social room. This committee was effective in restraining any tendency of students to abuse the privileges of the social room by rough and ungentlemanly conduct. The Entertainment Committee, Mr. Harold M. Davis, Chairman, arranged

for a variety of entertainments open to all students; some of these, such as the concert and minstrel show, developed such a large attendance that it was found necessary to change the place of the entertainment from the social room of the Union to Huntington Hall. The Dining Room Committee, of which Mr. Walter F. O'Brien was Chairman, made a daily inspection of the food before it was furnished to the students. They also saw that the room was made attractive with flowers, and arranged for an orchestra to play at the dinner hour.

Mr. Maurice Scharff, the President's Assistant, and a graduate student, was given complete charge of the management of the dining room, hiring the steward and waiters, buying the provisions, and arranging for class and society dinners. Mr. Scharff also had charge of the finances, and his report gives an excellent financial showing for the year. Not only did the dining room this year pay its running expenses and the cost of the new equipment, but there was a balance left over sufficient to pay the deficit of the previous year.

The Dean is Ex-Officio Chairman of the following committees:—Recommendation of Graduates for Appointment; Physical Training; First Year Students; and Conduct of Examinations. Reports of all these committees have been sent to the Secretary of the Faculty, but special mention of a few facts may be interesting.

During the past year one hundred and twenty-seven graduates have filed appointment blanks with the committee on Recommendation of Graduates. The majority of these men had positions, but wished to be considered eligible for new appointments. During the same period one hundred and ninety-six applications from employers were received by the committee asking for the names of graduates. All such applications on being received were sent at once to the professors in charge of the Appointment of Graduates in the various departments. This number of

applications does not include the many requests for graduates sent to the heads of the departments directly. So far as the committee can judge of this matter there seem to be very few of our graduates out of employment, and a very small number of them care to engage in teaching. There were some fifty applications received during the year for teachers, and in only one or two instances were we able to secure men who wished to take these positions.

The classes in Physical Training were held under the direction of Mr. Frank M. Kanaly, assisted by Mr. Calvin P. Eldred '12. The work has been most satisfactory. In the first term there were two hundred and eighty-four first year men taking the course; in the second term two hundred and seventy-four. The number of first year men who substituted track athletics and other physical exercises (such as practice for hockey and basket ball teams) for regular gymnasium work, was thirty-seven. The difference between the physical measurements of students taken at the beginning and end of the year showed a very general improvement in the first year men, and five Cabot Medals for the greatest improvement were awarded to the following students: Otto E. Strahlmann '14, Malcolm J. Sayward '14, Philip Covitz '14, Alan H. Means '12, and Robert C. Doremus '14. Five others who received Honorable Mention were John E. W. Giffels '14, Herman A. Affel '14, Edward P. Alexander '14, Lyle M. Richardsdon '14, and Eugenio S. Garza '14. Of the three hundred and twenty-seven men who took physical exercise, seventeen were marked "Failure" on account of absences. These men are required to repeat the work, as a mark of "P" in Physical Training is required for all students in regular courses.

## STATISTICS OF ILLNESS FOR THE SCHOOL YEAR 1910-11.

*Fourth-Year Class.*

There were three hundred and four students in the fourth-year class. Of these eighteen were reported ill during the school year 1910-11. Classified by illnesses there were the following cases: abscess, 2; accident to eyes, 1; acute indigestion, 1; cold, 1; diphtheria, 1; grippe, 2; malaria, 1; measles, 1; rheumatic fever, 1; trouble with eyes, 1; typhoid fever, 1; unspecified cases, 5.

*Third-Year Class.*

In this class there were three hundred and ninety-seven students, of whom forty-eight were reported ill during the year. The following cases were reported: appendicitis, 1; bronchitis, 2; cold, 2; conjunctivitis, 1; grippe, 4; hemorrhage of the nose, 1; injury to eye, 1; injury to foot, 1; iritis, 1; measles, 1; mumps, 2; pink eye, 3; pleurisy, 1; sprained wrist, 1; tonsilitis, 5; trouble with eyes, 4; unspecified cases, 17.

*Second-Year Class.*

This class numbered four hundred and four students, of whom fifty-two were reported ill during the year. There were the following cases: acute conjunctivitis, 1; acute indigestion, 1; boil on neck, 1; bronchitis, 1; cold, 2; fever, 1; gastritis, 1; grippe, 3; head trouble, 1; influenza, 1; jaundice, 1; laryngitis, 1; muscular rheumatism, 1; nervous breakdown, 1; neuralgia, 2; operation on foot, 1; quinsy sore throat, 1; severe burn, 2; sore foot, 1; tonsilitis, 2; trouble with ear, 1; trouble with eyes, 2; tuberculosis, 1; twisted knee, 1; typhoid fever, 1; unspecified cases, 20.

*First-Year Class.*

The first-year class numbered three hundred and sixty-five students. Of this number one hundred and thirteen were reported ill during the year. Classified by illnesses there were the following cases: abscess on arm, 1; abscess on foot, 1; acute indigestion, 3; appendicitis, 2; broken collar-bone, 1; bronchitis, 2; bruised knee, 1; chicken pox, 1; cold, 3; diarrhoea, 1; double flat-foot, 1; ear-ache, 1; german measles, 1; grippe, 8; heart trouble, 1; hernia, 1; injury to eye, 1; injury to foot, 2; injury to knee, 2; injury to leg, 1; jaundice, 1; malaria, 1; mumps, 1; nasal trouble, 1; operation on ear, 1; operation on nose, 1; operation on throat, 1; pleuro-pneumonia, 1; pneumonia, 1; ptomaine poisoning, 1; rheumatism, 2; scarlet fever, 1; scarlatina, 1; septic infection of heel, 1; sore throat, 1; sprained ankle, 2; sprained back, 2; sprained finger, 3; stomach trouble, 2; tonsilitis, 5; trouble with eyes, 4; ulcerated tooth, 2; unspecified cases, 42.

## SUMMARY.

	Number in Class.	Number Ill.	Number of Deaths.
Fellows and Graduates . . . . .	36	0	0
Fourth Year . . . . .	304	18	0
Third Year . . . . .	397	48	0
Second Year . . . . .	404	52	0
First Year . . . . .	305	113	0
	1,506	231	0

ALFRED E. BURTON,

*Dean.*

## REPORT OF THE MEDICAL ADVISER.

The medical work at the Institute has been carried on along the same lines as in previous years. Consultation hours have been held on two afternoons a week throughout the school year and as usual the students have fully occupied the time. The number of students coming to the medical office has greatly increased in the last year or two partly on account of the recent requirements for physical training in the Freshman year, and the necessity of a doctor's certificate to explain absence from physical training and military drill either on account of physical disability, or acute illness. In order to accommodate all those who came for advice the time of consultation usually had to be extended much beyond the stated hour. During the past two years the average extra time needed has been from one-half to three-quarters of an hour.

This year an effort was made, at the suggestion of the President, to reduce the amount of work of the medical office without lessening its usefulness to the student body. Up to this time all students have used the medical office freely without regard to their ability to pay for medical advice elsewhere.



The main reason for giving the students free advice has been the belief that there are some men so impecunious that they may hesitate to consult a competent medical man when they ought to do so, and thereby run great risks of doing a permanent evil to their health. At the same time it does not seem desirable to establish on a permanent basis the policy of giving free medical advice to all. As a result of this decision an effort was made this year to encourage the men who are abundantly able to pay for medical advice to seek it elsewhere, and to partially restrict the work of the medical adviser to those students who were least able to pay for it. During the office hours free medical advice was given to as many students as could be dealt with satisfactorily within the allotted time, and in case all the students who came could not be dealt with within the hour, preference was given to urgent cases and to those students whose pecuniary circumstances made it difficult for them to pay for medical advice. In order that this arrangement might be thoroughly understood by the students the following notice was posted at the President's suggestion on the door of the medical office:

"The Medical Adviser may be consulted by students without charge on Mondays and Thursdays from 4 to 5 P. M. These hours of free medical advice are intended primarily for urgent cases, for those seeking excuse from drill or physical training on the ground of illness, and for students whose circumstances make it difficult to pay for the services of a thoroughly competent doctor. If time permits advice will gladly be given to others by the Medical Adviser."

This plan has worked in a thoroughly satisfactory way as far as I am able to judge and seems to have accomplished just what was intended, namely to use all the allotted time profitably, and to lessen the giving of free medical advice to those who could easily pay for it elsewhere.

The following table gives the number of office visits made

and the number of students seen, with a few figures of previous years for comparison.

	1909	1910	1911
Total number of office visits made . . . . .	432	464	332
Total number of different students seen . . . . .	318	302	226
Greatest number of students seen per day . . . . .			10
Least number of students seen per day . . . . .			2
Average number of students seen per day . . . . .			5+
Number of students making more than one visit . . . . .			59

A large majority of the men found it necessary to make only a single visit; only three men made more than five visits, and six was the largest number made by any one student. These facts speak well for the general health of the students.

A great variety of illnesses were treated at the Medical Office, the most numerous being diseases of the digestive organs, of the nose and throat, of the skin, and minor surgical diseases. About twenty men were seen who suffered from a severe illness such as appendicitis, diphtheria, goitre, jaundice, pleurisy, or diseases of the heart or kidney and most of these were sent to the Massachusetts General Hospital for treatment. A small number of students were referred to specialists for treatment of the eye, ear, or skin.

In addition to my work at the Institute office I have seen about forty men at my private office, and a small number at their residences. Fourteen men were examined for the United States Civil Service, and I have many opportunities to help men decide whether or not they are physically fit for certain athletic sports.

The cases of contagious diseases have been, as usual, few in number. We had one case of diphtheria, two of scarlet fever, three of measles, three of mumps, and one of chicken pox.

The usual talk on personal hygiene was given by the Medical Adviser to the Freshman class, taking up the following subjects: bathing, exercise, care of the eyes, minor

ailments, the use of tobacco and alcohol, and the prevalence and dangers of venereal disease.

On account of the expectation of new buildings for the Institute, and in view of the responsibility which every large educational institution has for the health of the students, the suggestion was made by the Medical Adviser that a Committee on Hygiene be appointed to look after the sanitation of the buildings and the health of the students. Such a committee might have a representative from the department of Sanitary Science, of Engineering (for heating and ventilation), of Physical Culture and of Medicine. Some of the things which this committee might be asked to supervise are as follows: the sanitation of buildings; heating and ventilation; condition of the toilets; the use of sanitary "bubble" drinking fountains instead of cups which are used by many students in succession; the use of some system of vacuum cleaning of rooms instead of dry sweeping and dusting; the use of some individual towel distributor instead of roller towels; the prevention of the spitting habit; the supervision of food for the lunch counters of the Institute; one or two yearly inspections of student lodging houses by a trained nurse, or a member of the Sanitary Science department; quarantine and disinfection in contagious diseases; emergency kits accompanied by charts of First Aid to the Injured; for use in laboratories where minor injuries occasionally occur; a few simple practical talks to the janitors on the matter of heating, lighting, ventilation and cleaning.

A considerable number of these things have been looked after in the past by the Medical Adviser; others could be better cared for by a committee.

FRANKLIN W. WHITE,  
*Medical Adviser.*

### REPORT OF THE LIBRARIAN.

Since the last Report the fiscal year of the Institute has been changed so as to end on the 30th of June. Therefore, the statistics in the present Report cover the nine months from the 1st of October, 1910, to the 30th of June, 1911.

During this period the total receipts of the Library have amounted to 3,874 items, the source of these is shown in the following table:—

#### TOTAL RECEIPTS, 1910-1911.

By Purchase . . . . .	792	
By Binding . . . . .	1,002	
By Gift, Volumes . . . . .	777	
By Gift, Pamphlets and Maps . . . . .	1,303	2,080
		<hr/>
Total . . . . .		3,874

The cost of these receipts, and the maintenance of the Library, exclusive of salaries, as shown by the bills approved by the Librarian, amounts to \$6,256.22, which is offset by \$16.15 received for the sale of duplicates, and \$4.07 discounts for cash on bills for supplies. These items are classified as shown in the following table:—

#### BILLS APPROVED, 1910-1911.

Purchase of books . . . . .	\$2,343.45	
Binding . . . . .	1,785.92	
Subscriptions to Periodicals . . . . .	1,849.13	
Equipment . . . . .	36.00	
Supplies . . . . .	241.72	
		<hr/>
		\$6,256.22
Less Receipts from Sale of Duplicates. . . . .	\$16.15	
Less Discounts . . . . .	4.07	20.22
		<hr/>
Total . . . . .		\$6,236.00

After allowing for deductions of books removed from the Library, losses, etc., the total net increase of the Library

during the period of this Report amounts to 2,438 volumes, 819 pamphlets, and 438 maps, making the total contents of the Library, June 30th, 1911, 92,148 volumes, and 25,875 pamphlets and maps.

The distribution of these items among the several departments, and the amount expended for each department for books during the year, are shown in the following table:—

TABLE OF THE NET INCREASE WITH THE COST OF THE SAME DURING THE YEAR 1910-1911, AND THE TOTAL CONTENTS OF THE LIBRARIES OF THE INSTITUTE, JUNE 30, 1911.

LIBRARIES.	NET INCREASE.				TOTAL CONTENTS.	
	Volumes.	Pamphlets.	Maps.	Cost.	Volumes.	Pamphlets and Maps.
<b>General Library:</b>						
General . . . . .	243	107	—	\$209.47	7,657	5,205
English . . . . .	17	—	—	33.07	3,528	40
Military Science . . .	—	—	—	—	367	9
Walker Memorial . . .	—	—	—	—	485*	—
Other Departments . .	27	—	—	13.00	76.	1
<b>Totals General Library</b>	<b>287</b>	<b>107</b>	<b>—</b>	<b>\$255.54</b>	<b>12,113</b>	<b>5,255</b>
Architecture . . . . .	141	4	—	291.21	4,610	274
Biology . . . . .	123	91	—	335.51	3,935	1,092
Chemistry . . . . .	233	194	—	738.15	12,441	2,851
Electrical Engineering	57	(—1)	—	126.66	1,890	108
Engineering . . . . .	472	109	—	601.25	16,190	5,578
Geology . . . . .	221	67	77	256.86	4,530	3,380
History & Economics	332	116	—	354.99	15,138	4,071
Margaret Cheney Room	8	—	—	34.00	823	15
Mathematics . . . . .	99	10	—	149.22	2,274	308
Mining . . . . .	187	67	28	311.85	5,475	909
Modern Languages . . .	22	—	—	61.00	1,914	57
Naval Architecture . .	74	1	333	160.97*+	1,741	530
Physics . . . . .	182	54	—	452.16	9,074	1,447
<b>Totals . . . . .</b>	<b>2,438</b>	<b>819</b>	<b>438</b>	<b>\$4,129.37</b>	<b>92,148</b>	<b>25,875</b>

\* Kept in the Reading Room of the Technology Union.

\*+Weld Fund, \$106.34.

The general catalogue of the Library contains 113,027 cards, of which 3,737 were added during the period of this Report.

There has been little change in the lists of periodicals and other serials received during the year. The numbers of these publications received for each department, and their cost, is shown in the following table; the total number, 1060, does not include reports of agricultural experiment stations, railroad reports, and a number of trade catalogues and publications of this character; if these were included, the number would be very much increased.

TABLE OF PERIODICALS AND OTHER SERIAL PUBLICATIONS RECEIVED DURING THE YEAR 1910-1911, CLASSIFIED BY DEPARTMENT AND METHOD OF PAYMENT.

LIBRARIES.	NUMBER RECEIVED.				ESTIMATED COST.		
	Gifts.	Charged to Department.	Periodical Account.	Totals.	Department Account.	Periodical Account.	Totals.
General . . . . .	56	12	35	103	\$36.20	\$132.56	\$168.76
Architecture . . . . .	9	3	29	41	10.60	146.13	156.73
Biology . . . . .	21	11	37	69	37.40	257.62	295.02
Chemistry . . . . .	40	46	39	125	213.75	279.15	483.90
Electrical Engineering . . . . .	8	11	25	44	30.40	101.69	132.09
Engineering . . . . .	96	53	74	223	133.31	278.75	412.06
Geology . . . . .	27	6	17	50	30.80	121.95	152.75
History & Economics . . . . .	72	43	47	162	91.39	129.65	221.04
Margaret Cheney Room . . . . .	—	8	—	8	24.00	—	24.00
Mathematics . . . . .	4	5	20	29	8.95	92.25	101.20
Mining . . . . .	43	9	31	83	32.28	135.26	167.54
Modern Languages . . . . .	2	3	17	22	4.50	80.30	84.80
Naval Architecture . . . . .	9	11	6	26	49.07	17.26	66.33
Physics . . . . .	30	13	32	75	77.12	156.12	233.24
Totals . . . . .	417	234	409	1,060	\$779.77	\$1,919.69	\$2,699.46

An important part of the maintenance of the Libraries consists in keeping the periodicals, the most valuable part of our equipment, bound and in proper order. The estimated cost, chargeable to each department for this purpose annually, is given in the table which follows below:—

ESTIMATED COST OF BINDING PERIODICALS AND OTHER SERIALS, 1911.

DEPARTMENTS.	Periodicals.	Cost.	Other Serials.	Cost.	Total Cost.
General . . . . .	28	\$53.05	1	\$3.67	\$56.72
Architecture . . . . .	28	78.20	2	2.68	80.88
Biology . . . . .	25	39.70	4	6.42	46.12
Chemistry . . . . .	80	138.58	3	4.35	142.93
Electrical Engineering . . . . .	26	58.13	1	.47	58.60
Civil Engineering . . . . .	68	138.26	4	4.87	143.13
Mechanical Engineering . . . . .	42	105.01	0	—	105.01
Economics . . . . .	59	79.93	3	2.40	82.33
History . . . . .	11	15.25	1	.90	16.15
Geology . . . . .	14	17.60	1	.75	18.35
Mathematics . . . . .	25	34.70	1	1.15	35.85
Mining . . . . .	47	86.50	4	4.40	90.90
Modern Languages . . . . .	4	4.00	0	—	4.00
Naval Architecture . . . . .	11	21.30	1	1.50	22.80
Physics . . . . .	38	61.30	5	5.92	67.22
Total . . . . .	506	\$931.51	31	\$39.48	\$970.99

The total amount, \$970.99, is about 30 per cent. of the whole amount spent for periodicals and other serials.

Beside the periodicals, however, a considerable amount must be spent annually for rebinding of books which have suffered from use in the Library, and for binding the new books published abroad. The total amount actually spent for binding during the year was \$1,785.92, distributed among the different departments as shown in the following table:—

EXPENDITURES FOR BINDING, 1910-1911.

General . . . . .	\$144.14
Architecture . . . . .	89.64
Biology . . . . .	9.20
Chemistry . . . . .	248.68
Civil and Sanitary Engineering . . . . .	486.80
Mechanical Engineering . . . . .	149.81
Electrical Engineering . . . . .	83.06
Geology . . . . .	170.00
History . . . . .	12.15
Economics . . . . .	72.54
Mathematics . . . . .	40.55
Mining . . . . .	115.94
Modern languages . . . . .	

Naval Architecture . . . . .	\$49.95
Physics . . . . .	113.46
Other Departments . . . . .	
Total . . . . .	\$1,785.92

Owing to decreased appropriations, the orders issued for new books have been considerably less than usual, amounting only to 769 items, and there have been 445 orders issued for binding.

The use of the Library, as recorded by the attendants in charge, continues to be about the same amount. The circulation of books for home use for the different libraries that have reported, is shown below:—

## CIRCULATION OF BOOKS, 1910-1911.

General Library . . . . .	1,248
Architecture . . . . .	3,364
Biology . . . . .	241
Chemistry . . . . .	2,317
Engineering . . . . .	1,822
Geology . . . . .	
Mining . . . . .	1,034
Naval Architecture . . . . .	
Physics . . . . .	1,789

The use of the General Library during the evening still remains disappointingly low. The Library was open from five until ten on 161 days; the average attendance from five to seven was 11.8 men, and from seven to ten, 7.6 men.

In connection with the plans for the new buildings of the Institute the Librarian was requested to make estimates of the needs of the libraries, and as this brought out results with reference to the Institute libraries not heretofore published, it seems desirable to put them on record, and they are given in the two tables which follow:—



TABLE A. NUMBER OF VOLUMES (*v*), LENGTH OF SHELVING (*f*), AND THE RATIOS *v/f* AND *f/v* FOR EACH LIBRARY, OCTOBER 1, 1910.

LIBRARIES.	Volumes Oct. 1, 1910. <i>v.</i>	Shelves Running feet. <i>f.</i>	Volumes per foot. <i>v./f.</i>	Feet per Volume. <i>f./v.</i>
General . . . . .	11,341	1,767	6.42	0.153
Architecture . . . . .	3,494*	510	6.85	0.143
Biology . . . . .	3,812	537	7.10	0.141
Chemistry . . . . .	12,208	1,529	7.98	0.125
Electrical . . . . .	1,833	356	5.15	0.194
Engineering . . . . .	15,553†	1,951	7.97	0.123
Geology . . . . .	4,309	520‡	8.29	0.121
History & Economics . . . . .	14,806	2,203	6.72	0.149
Mathematics . . . . .	2,175	321	6.77	0.143
Mining . . . . .	5,288	828	6.39	0.157
Modern Languages . . . . .	1,892	225	8.41	0.119
Naval Architecture . . . . .	1,667	213	7.83	0.123
Physics . . . . .	8,892	1,271	7.00	0.143

\* After deducting 975 volumes kept in atlas cases occupying 612 cu. ft.  
 † After deducting 165 volumes kept in atlas cases occupying 150 cu. ft.  
 ‡ Additional chart cases occupy 213 cu. ft.

TABLE B. GROWTH IN VOLUMES DURING 10 YEARS, OCTOBER 1, 1900 TO OCTOBER 1, 1910; AND ESTIMATED MEAN ANNUAL INCREASE IN SHELF SPACE OCCUPIED.

LIBRARIES.	Volumes Oct., 1910. <i>v.</i>	Volumes Oct., 1900.	Difference $\Delta v.$	Mean Annual increase in Shelf Space. $\Delta v/10 (f/v)$
General . . . . .	11,341	7,395*	4,431 Vols	69.12 feet.
Architecture . . . . .	4,469	2,639	1,830 "	26.71 "
Biology . . . . .	3,812	2,371	1,441 "	20.31 "
Chemistry . . . . .	12,208	7,944	4,264 "	53.29 "
Electrical . . . . .	1,833	—	1,833 "	35.55 "
Engineering . . . . .	15,718	8,783†	6,935 "	87.37 "
Geology . . . . .	4,309	2,074	2,235 "	27.04 "
History & Economics . . . . .	14,806	10,157	4,649 "	69.26 "
Mathematics . . . . .	2,175	1,035	1,140 "	16.86 "
Mining . . . . .	6,288	2,589	2,699 "	42.37 "
Modern Language . . . . .	1,892	834	1,058 "	12.58 "
Naval Architecture . . . . .	1,667	—	1,667 "	21.33 "
Physics . . . . .	8,892	6,309‡	2,583 "	36.93 "

\* General Library after deducting 834 volumes transferred to Modern Language Department.  
 † Engineering Library after deducting 709 volumes transferred to Naval Architecture Department.  
 ‡ Physics Library after deducting 396 volumes transferred to Electrical Engineering Department.

Table A. shows the condition of the libraries on the 1st of October, 1910, with respect to the number of volumes (*v*) in each library, and the length of shelf (*f*) in feet used to store them.

The 3rd column of the table shows the average number of volumes per running foot of shelf ( $v/f$ ) and the fourth column is a reciprocal of this ( $f/v$ ), showing how much shelf room is required on the average per volume.

The measurements given in this table were made by the Librarian and one of the assistants, and the calculations given in columns 3 and 4 were made independently by two of the assistants, and checked by the Librarian.

It will be noticed that the size of the books varies considerably in these different libraries, and for that reason it would seem best to calculate the needs of each library separately.

Table B. shows the growth of the libraries during the ten years from Oct. 1st, 1900 to Oct. 1st, 1910, and the mean annual increase in shelf room required, based on the present ratio of volumes to length of shelf in each library. From this table it is easy to calculate the requirements at any period in the future, assuming that the increase in the libraries will continue at a fairly uniform rate.

That a library without a librarian is an incumbrance rather than an asset, is becoming more and more recognized, and with this has come an increased recognition of librarianship as a profession. The day is past when any honest person who could write a fair hand and loved books was supposed to be fitted for such a position. The modern librarian is not a mere custodian of books, nor a simple classifier and cataloguer. He is, on the contrary, a specialist skilled in the uses of books as sources of information, able in classifying and cataloguing the books so as to make them most available for use, and ready to instruct anyone who desires to know how to use the library to the best advantage. The larger engineering offices and industrial establishments are finding a well selected library to be a necessary part of their equipment, and a properly qualified librarian in charge of equal importance. This state of affairs,

coupled with lack of funds for the increase of salaries, has resulted in the loss to the Institute of the services of Miss Edna F. Winn, S. B., who, after four years of excellent work in charge of the Engineering Library, has resigned to take a position as librarian in the Engineering office of Messrs. D. C. & W. B. Jackson. Her place has been filled by the promotion of Miss Florence G. Finley, S. B., formerly in charge of the Chemical Library, and Miss Bernice Clark has been promoted from the position of junior assistant, to that of the assistant in charge of the Chemical Library. Miss Minnie E. Burke, S. B., (Simmons) has been appointed junior assistant in the General Library.

In the previous Report reference was made to the co-operation of the Librarian with the Special Libraries Association. This co-operation has been continued, and volumes have been lent to other institutions.

In this connection attention may be called to the increased facilities of the Institute in the possession of three copies of the new edition of the Encyclopedia Britannica, a copy of the new edition of the Americana, and the installation in the General Library of Nelson's Loose Leaf Encyclopedia. In connection with the latter, there is a bureau of information to which the Institute is entitled to refer, and the Librarian will be glad to receive requisitions for information from any member of the Institute. A request by telephone or letter to the Office of the Librarian will start at once an inquiry on any question on which information is desired, either to the source of information in the Special Libraries Association or to the Nelson Bureau of Information.

A new edition of the Guide to the Libraries of the Institute was published during the summer, distributed to the departments, and placed where copies would be accessible to the students. That this guide attracted attention and appeared to be useful to the students, is to

be inferred from the fact that the edition of 500 copies is already exhausted.

During the year death has removed two friends of the Institute who were frequent donors of gifts to the Library. Throughout her life Mrs. William Barton Rogers took the greatest interest in the Library of the Institute and made frequent gifts to it. She had given a number of books during the year, and after her death the Institute received a bequest of a considerable portion of her private library, consisting of 169 volumes on various subjects. Dr. Charles Goddard Weld, whose benefactions to the Institute were numerous and large in amount, contributed during his life many volumes to the Institute for the Library of Naval Architecture. During the period covered by this Report he presented to the Institute 31 volumes. A peculiarly welcome gift to the Institute is a collection of books on general literature from an anonymous friend, given in memory of John Hume Tod. Up to the 30th of June 67 volumes of this gift had been received, and that is only a small part of what has been promised. From the estate of the late Charles O. Parsons of the Class of 1873 were received 18 pamphlets on Geological subjects; from John T. Arms, Jr., of the Class of 1911, Italian Vignettes, by his sister Miss Mary W. Arms; from Professor Hosmer, his Text-book on Practical Astronomy; from Mrs. Richards, her work on Conservation by Sanitation and also Euthenics; from Professor Doten, his report on Compensation for Industrial Accidents; from Professor Gill, a copy of his report on Oil Analysis; from Professor Berry, his book on Temperature-entropy Diagram; from Professor Hall, his translations of Ostwald, Introduction to Chemistry, and Borchers, Metallurgy; from Professor Thompson, his work on Applied Electrochemistry; from Professor Allen, his work on Railroad Curves and Earthwork; from Mr. Kurt Vonnegut of the Class of 1908, a year's subscription to the Berliner Architekturwelt; from Mrs. William H. Workman,

An Account of the Determination of the Altitude of Mount Huascaran; and from the Technique Board, the Technique for 1912.

Other gifts were received from Professor Locke, Professor Richards, Professor Porter, Mr. Allen Arnold, Professor Peabody, Mr. A. T. Safford, Mrs. E. W. Dennison, Mr. A. Smith, Professor Thorpe, and Professor Tyler, Professor Langley and Professor Robbins. We also received from Mr. B. J. Arnold his report on the Pittsburg Transportation Problem; from the United States Coast and Geodetic Survey, a complete set of 333 coast charts; from Senator Lodge, Senator Crane, and the Honorable Andrew J. Peters many United States Public Documents.

ROBERT PAYNE BIGELOW,  
*Librarian.*

#### REPORT OF THE REGISTRAR.

The registration for this year on the first day of November was 1556. The number of students in actual attendance was 1559 and there were two non-resident fellows and five non-resident candidates for advanced degrees. This, except for the registration in the year 1902-1903, is the largest in the history of the school. If we were to count the number of students who attended the Summer School but did not return to the school for the regular year, the total registration would amount to over 1600. In fact, if we counted the number of students who attended in the second term and who were not registered in the first term, the total would be even greater than this.

The increase in numbers is in students from our own country rather than from foreign countries. The number of foreign students is 101, one less than last year. The only noticeable increase from any one country is that from China, twenty-seven came from there last year, and thirty-

six this year. The number of students from Mexico has dropped from nine to five. Those from the Argentine Republic from five to two. Of the several sections of our own country the largest number of students comes from the North Atlantic states as formerly and as usual the largest number from any one state, 55 per cent. of the student body, is that from Massachusetts where there is a larger gain in numbers than from any other state, although from Connecticut and New Jersey there is a larger gain in proportion. There has been a slight loss in the number from New York and Rhode Island. The other districts of the country, namely, the South Atlantic, South Central, North Central, and Western states all send at least as many as last year.

The number of women students is seven, one of whom is a third year student in Architecture and one an unclassified student in Chemistry. The other five are special students without course classification.

It is interesting to note in connection with the number of students from Massachusetts and the division of them among the cities and towns from which they come, that the number from Cambridge has increased from 29 to 37 so that it ties with Newton in the second place in the list of towns arranged by numbers sent to the school.

The total number of the instructing staff has dropped from 251 to 245. The number of lecturers specially appointed each year has, however, risen from 21 to 25. The total of the Faculty, instructors, and assistants has dropped from 217 to 209, hence with the increase in the number of students and the decrease in the number of the instructing staff, the ratio of students to each member of the instructing staff is somewhat greater than for the past few years. It is 7.5 compared with 6.6 last year.

An important change in registration has taken effect this year, whereby the number of "Special" students has been greatly reduced compared with the reports of former years.

The Faculty has changed its rule concerning the classification of students and now the "Special" students are those who come to the Institute for some particular work. Some have had professional experience, some are people of mature age, and some have had earlier technical training. Previously a large proportion of the students who were listed as "Specials" were students who were not carrying full work or they were those who had failed to fulfill all the requirements of the class with which they were associated. These students are now termed "Unclassified" students, so that while previously this term "Special" carried with it possible adverse criticism, it is now complimentary.

Among the professional courses there have been two marked gains this year, in Mechanical Engineering and in Chemistry. Sanitary Engineering and Electrochemistry likewise have increased in numbers. The large increase spoken of last year in the course in Chemical Engineering has been maintained.

The number of students entering this year from other colleges is practically the same as last year. The number for the two years being 192 and 190. Again the largest number of these students enter the third year class. The number of our students who are graduates of other colleges is larger than last year, while the number this year from American colleges is less than last year; the 37 graduates of foreign universities is about twenty-five per cent. more than last year. The 112 colleges and universities represented by these students is larger by nine than last year.

The graduating class of last June followed the large one of 1910. Four years previous as freshmen the students numbered considerably less than the preceding class, but the class gained by the numbers entering from other colleges so that its number at graduation was practically as large as any of the classes of the last few years.

In this graduating class the number graduating from Mechanical Engineering and the Electrical Engineering

courses was equal and except for the forty-eight who graduated from the course in Civil Engineering, they led by a large majority the number of graduates from any other course.

In the Summer School the registration was larger than for several years and the proportion who registered to anticipate work was particularly large.

The amount of undergraduate scholarship assistance given during the school year of 1911 was \$21,125. The total number of students assisted from these funds was 187. In addition to this 80 students were aided by the state, there being a total of 243 students receiving scholarship aid, or 16.1 per cent. of the whole number of students at the Institute.

For the current year the new legislative act concerning State scholarships at the Institute takes effect and in place of the forty state scholarships of last year that were divided among eighty students, there are this year eighty full scholarship awards.

In last year's report it was mentioned that the records of students from various preparatory schools were examined. During the past year an examination has been made of all the records of the students of the Institute based upon a scale which takes into account whether or not each subject occupies a large number of hours or but one hour per week and whether or not time for preparation is assigned to each subject, and how much. Account also is taken of whether or not students are taking full work.

Another investigation has been made concerning the number of records of various grades in each of the several hundred courses given each term and the results of this research have been turned over to a committee appointed by the Faculty to consider the number of failures in each subject and the causes of these failures.

The second convention of collegiate registrars was held last summer in the rooms of the Institute. A permanent



organization was formed and various committees were appointed. The Registrar of the Institute was made chairman of a committee appointed to consider a standard form for the transfer of records from one college to another. This committee is to report to the convention to be held next summer.

At the time that this report is due a reorganization of this office has been authorized whereby the Registrar has been appointed Registrar and Recorder, so that the duties outlined in the rules of the Faculty for the Registrar and the Recorder are now assumed by one individual.

In this reorganization Mr. O. F. Wells, who has served the Institute faithfully for some twenty years, has been appointed Assistant Registrar. The office is exceedingly fortunate in having his assistance, especially in the Information Office, an important post, where his intimate knowledge of the rules and requirements of the Faculty and his long experience at the Institute will serve to give visitors and people of the school accurate and courteous information. His hearty co-operation will surely lead to the higher efficiency of the office.

#### THE CORPS OF INSTRUCTORS.

	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.
Professors . . . . .	43	44	44	45	41
Associate Professors . . . . .	18	18	14	20	17
Assistant Professors . . . . .	25	33	32	31	33
Research Professors . . . . .	—	—	—	—	4
Faculty . . . . .	86	95	90	96	95
Instructors . . . . .	72	62	69	66	64
Assistants . . . . .	52	50	51	55	50
	124	112	120	121	114
Faculty, Instructors and Assistants	210	207	210	217	209
Research Associates . . . . .	8	6	12	8	5
Research Assistants . . . . .	3	1	1	5	6
	11	7	13	13	11
Lecturers . . . . .	32	31	18	21	25
Total . . . . .	253	245	241	251	245

YEARLY REGISTRATION SINCE THE FOUNDATION OF THE INSTITUTE.

Year.	No. of Students.	Year.	No. of Students.	Year.	No. of Students.
1865-66	72	1881-82	302	1897-98	1,198
1866-67	137	1882-83	368	1898-99	1,171
1867-68	167	1883-84	443	1899-00	1,178
1868-69	172	1884-85	579	1900-01	1,277
1869-70	206	1885-86	609	1901-02	1,415
1870-71	224	1886-87	637	1902-03	1,608
1871-72	261	1887-88	720	1903-04	1,528
1872-73	348	1888-89	827	1904-05	1,561
1873-74	276	1889-90	909	1905-06	1,466
1874-75	248	1890-91	937	1906-07	1,397
1875-76	255	1891-92	1,011	1907-08	1,415
1876-77	215	1892-93	1,060	1908-09	1,461
1877-78	194	1893-94	1,157	1909-10	1,479
1878-79	188	1894-95	1,183	1910-11	1,506
1879-80	203	1895-96	1,187	1911-12	1,559
1880-81	253	1896-97	1,198		

THE STUDENTS.

REGISTRATION BY CLASSES.		Classi- fied.	Unclas- sified.	Total.
Resident Fellows		4	—	4
Other Candidates for advanced degrees		34	—	34
Fourth Year		280	20	300
Third Year		257	114	371
Second Year		257	139	396
First Year		312	75	387
Special		—	—	67
Total		—	—	1,559
Non-resident Fellows		—	—	2
Non-resident Candidates for advanced degrees		—	—	5
Grand Total		—	—	1,566

CLASSIFIED AND UNCLASSIFIED STUDENTS BY COURSES FOR THE CURRENT YEAR.

YEAR.	Without Course Classification.	Civil Engineering.	Mechanical Engineering.	Mining Engi- neering and Metallurgy.	Architecture.	Chemistry.	Electrical Engineering.	Biology.	Physics.	General Science.	Chemical Engineering.	Sanitary Engineering.	Geology.	Naval Architecture.	Naval Construction.	Electro-chemistry.	Total.
Graduates	—	5	1	2	4	6	7	1	—	—	—	2	2	—	4	—	34
4th { C.	—	59	50	22	20	8	56	3	3	1	37	13	—	5	2	2	280*
U.	—	2	2	6	2	—	2	2	—	—	3	—	—	—	1	—	20
3d { C.	—	56	42	17	17	15	45	1	—	2	34	12	—	4	2	13	257*
U.	—	25	20	10	12	12	18	2	—	—	7	6	—	2	—	—	114
2d { C.	—	44	54	13	19	5	50	3	1	—	32	20	—	4	—	15	257*
U.	—	24	40	8	15	4	20	2	—	—	15	3	—	4	—	4	139
Special	17	2	5	1	23	6	5	6	—	—	1	1	—	—	—	—	67
Total { C.	—	164	147	54	60	34	158	8	4	3	103	47	2	13	8	30	828
U.	—	51	62	24	29	16	40	6	—	—	25	9	—	6	—	5	273
Sp.	17	2	5	1	23	6	5	6	—	—	1	1	—	—	—	—	67
		217	214	79	112	56	203	20	4	3	129	57	2	19	8	35	1,168

\* Deducting names counted twice.

TOTALS OF THE SAME CLASSIFICATION FOR FIVE YEARS.

YEAR.	Civil Engineering.	Mechanical Engineering.	Mining Engineering.	Architecture.	Chemistry.	Electrical Engineering.	Biology.	Physics.	General Science.	Chemical Engineering.	Sanitary Engineering.	Geology.	Naval Architecture.	Naval Construction.	Electro-chemistry.
1906-07 . . . . .	210	214	100	102	51	193	10	18	0	55	32	2	43	18	—
1907-08 . . . . .	210	227	118	84	53	202	17	21	2	59	39	0	37	16	—
1908-09 . . . . .	197	197	104	91	60	209	20	19	4	71	52	2	41	13	—
1909-10 . . . . .	207	204	99	109	44	203	22	4	4	84	60	1	41	14	14
1910-11 . . . . .	220	198	90	113	44	210	19	7	2	128	46	—	26	9	26
1911-12 . . . . .	217	214	79	112	56	203	20	4	3	129	57	2	19	8	35

NUMBER OF STUDENTS PURSUING CERTAIN LEADING BRANCHES OF STUDY.

	First Year.	Second Year.	Third Year.	Fourth Year.	Total.
Chemistry . . . . .	397	124	149	94	764
English . . . . .	382	314	48	—	744
Geology . . . . .	—	15	98	27	140
History and Economics . . . . .	—	292	367	98	757
Languages . . . . .	402	190	73	—	665
Mathematics . . . . .	408	374	135	11	928
Mechanic Arts . . . . .	—	165	70	108	343
Physics . . . . .	—	381	320	7	708

STATISTICS OF ADMISSION.

	Classified.	Unclassified.	Total.
Admitted clear . . . . .	173	5	178
“ with one condition . . . . .	61	13	74
“ with more than one condition . . . . .	30	19	49
“ on examination . . . . .	264	37	301
Total First-year Class . . . . .	312	75	387
Admitted but did not enter Examinations . . . . .			44
Candidates at June Entrance { Complete candidates . . . . .			605
{ Final “ . . . . .			2
Candidates rejected in June { Preliminary “ . . . . .			4
{ Partial “ . . . . .			55
			22
			83

Candidates in September for Entrance and Advanced Standing Examinations . . . . .	267
Candidates rejected in September	{ Complete candidates . . . . . 4
	{ Final " . . . . . 10
	{ Preliminary " . . . . . 12
Certificates of the College Entrance Examination Board submitted . . . . .	81

TOTAL REGISTRATION AND NUMBER OF NEW STUDENTS FOR TEN YEARS.

YEAR.	(1) Total No. of Resident Students.	(2) No. of Students in the Catalogue of the previous year who remain in the Institute.	(3) No. of New Students entering before issue of Catalogue.	(4) Of those in column (3) the following number are regular First-year Students.	(5) No. of New Students not of the regular First-year Class.
1902-1903	1,608	949	659	433	226
1903-1904	1,528	1,042	486	249	237
1904-1905	1,561	986	575	295	280
1905-1906	1,466	984	482	213	269
1906-1907	1,397	862	535	272	263
1907-1908	1,415	888	527	273	254
1908-1909	1,462	868	594	323	271
1909-1910	1,479	890	579	317	262
1910-1911	1,506	944	562	283	279
1911-1912	1,559	932	627	312	315

REGULAR FIVE-YEAR STUDENTS.

YEAR.	Total.	Civil Engineering.	Mechanical Engineering.	Mining Engineering.	Architecture.	Chemistry.	Electrical Engineering.	Biology.	Physics.	General Science.	Chemical Engineering.	Sanitary Engineering.	Geology.	Naval Architecture.	Electro-chemistry.
1st . . . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2d . . . . .	10	2	3	—	1	—	3	—	—	—	—	1	—	—	—
3d . . . . .	18	4	1	—	—	—	6	—	—	1	3	1	—	1	1
4th . . . . .	5	1	1	1	—	—	1	—	—	—	—	1	—	—	—
5th . . . . .	7	2	1	—	—	—	2	—	—	—	—	1	—	1	—
Counted twice .	40	9	6	1	1	—	12	—	—	1	3	4	—	2	1
	11	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	29	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NEW STUDENTS FROM OTHER COLLEGES BY YEARS.

CLASS JOINED AT INSTITUTE.	Years Spent at College.				Total.
	One.	Two.	Three.	Four, or more.	
First Year . . . . .	20	5	2	8	35
Second Year . . . . .	16	14	5	17	52
Third Year . . . . .	1	12	12	44	69
Fourth Year . . . . .	—	—	2	11	13
Graduate Year . . . . .	—	—	—	11	11
Total . . . . .	37	31	21	91	180

GRADUATE STUDENTS.

*American Colleges and Universities Represented.*

Alabama . . . . .	1	Mississippi Agricultural . . . . .	1
Amherst . . . . .	2	Missouri . . . . .	1
Bates . . . . .	1	Missouri Sch. Mining and Met. . . . .	1
Baylor . . . . .	1	Montana . . . . .	1
Boston College . . . . .	2	National . . . . .	1
Boston University . . . . .	3	Nebraska . . . . .	1
Bowdoin . . . . .	2	North Carolina . . . . .	2
Bradley Polytechnic Institute . . . . .	1	North Dakota . . . . .	2
Brown . . . . .	3	Oberlin . . . . .	4
Bryn Mawr . . . . .	1	Occidental . . . . .	2
California . . . . .	2	Oregon . . . . .	2
Central . . . . .	1	Oregon Agricultural . . . . .	1
City of New York . . . . .	3	Otterbein . . . . .	1
Colby . . . . .	1	Pennsylvania Military . . . . .	2
Colorado . . . . .	2	Pennsylvania State . . . . .	2
Cornell . . . . .	2	Pomona . . . . .	1
Dalhousie . . . . .	1	Princeton . . . . .	7
Dartmouth . . . . .	6	Richmond . . . . .	1
Dennison . . . . .	2	Rochester . . . . .	2
De Pauw . . . . .	1	Rutgers . . . . .	1
Drake . . . . .	1	Saint Louis . . . . .	6
George Washington . . . . .	1	Saint Mary . . . . .	1
Georgia . . . . .	1	Saint Xavier . . . . .	3
Georgetown . . . . .	2	Sacred Heart . . . . .	1
Grinnell . . . . .	2	South Carolina Military . . . . .	1
Grove City . . . . .	1	Spring Hill . . . . .	4
Hamilton . . . . .	2	Texas . . . . .	2
Haverford . . . . .	1	Tulane . . . . .	1
Harvard . . . . .	8	United States Naval Academy . . . . .	9
Holy Cross . . . . .	1	United States Military Academy . . . . .	2
Illinois . . . . .	1	Virginia . . . . .	2
Iowa State . . . . .	1	Virginia Military . . . . .	1
Johns Hopkins . . . . .	2	Wabash . . . . .	1
Kansas . . . . .	1	Washburn . . . . .	1
Lafayette . . . . .	1	Washington and Jefferson . . . . .	3
Lehigh . . . . .	1	Washington and Lee . . . . .	1
Leland Stanford Junior . . . . .	3	Whitman . . . . .	2
Maine . . . . .	1	Whitworth . . . . .	1
Marietta . . . . .	2	Williams . . . . .	5
Maryland Agriculture . . . . .	1	William and Mary . . . . .	1
Massachusetts Institute of Technology . . . . .	6	Wisconsin . . . . .	1
Michigan . . . . .	3	Worcester Polytechnic . . . . .	1
Middlebury . . . . .	1	Yale . . . . .	7
Mississippi . . . . .	1	Yankton . . . . .	1

177

*Foreign Colleges and Universities Represented.*

Anhui Provincial (China) . . . . .	2	Paris (France) . . . . .	1
Cambridge (England) . . . . .	1	Queens (Canada) . . . . .	1
Chinese Naval . . . . .	1	Royal Military (Canada) . . . . .	1
Chili Provincial (China) . . . . .	1	Shantien (China) . . . . .	1
Ecole Polytechnic (Montreal) . . . . .	1	Valparaiso . . . . .	1
Escuela Industrial (Buenos Ayres) . . . . .	2	Wuchang (China) . . . . .	1
Greece National (Athens) . . . . .	1	Syrian Protestant . . . . .	3
Havana . . . . .	1		
Heidelberg . . . . .	1		37
Imperial Polytechnic (Shanghai) . . . . .	8		
Japanese Naval Engineering (Tokio) . . . . .	1	Total from American Colleges and Universities . . . . .	177
Maimi (China) . . . . .	1		
McGill (Montreal) . . . . .	1	Total from Foreign Colleges and Universities . . . . .	37
Melbourne (Australia) . . . . .	1		214
Nanking (China) . . . . .	2		2
New Brunswick . . . . .	2		212
Oxford . . . . .	1	Counted twice . . . . .	

Graduates who are candidates for Advanced Degrees . . . . . 33  
 Graduates who are pursuing undergraduate work . . . . . 179  
 Colleges and Universities represented . . . . . 112

COLLEGE STUDENTS AMONG THE COURSES.

GRADUATES AND STUDENTS FROM COLLEGES.	Specials.	1st Year.	Civil Engineering.	Mechanical Engineering.	Mining Engineering.	Architecture.	Chemistry.	Electrical Engineering.	Biology.	Physics.	General Science.	Chemical Engineering.	Sanitary Engineering.	Geology.	Naval Architecture.	Naval Construction.	Electro-chemistry.	Total.
	Graduates . . .	4	7	41	28	13	23	19	33	4	1	—	17	7	2	3	8	2
Non-graduates .	—	17	32	34	13	30	13	27	3	—	2	12	2	—	—	—	2	187
Total . . .	4	24	73	62	26	53	32	60	7	1	2	29	9	2	3	8	4	399
Proportion, in per cent., of these students in the courses.																		
Graduates:	—	—	19	13	16	20	34	16	20	—	—	13	12	—	16	100	6	18
Non-graduates:	—	—	15	16	16	27	23	13	15	—	—	9	4	—	—	—	6	16

AGES OF STUDENTS.

THE GRADUATING CLASS, JUNE, 1911.

Under 20½ . . . . .	2
Between 20½ and 21 . . . . .	7
“ 21 “ 21½ . . . . .	19
“ 21½ “ 22 . . . . .	22
“ 22 “ 23 . . . . .	67
“ 23 “ 24 . . . . .	53
“ 24 “ 25 . . . . .	25
“ 25 “ 26 . . . . .	12
26 and over . . . . .	24

Total . . . . . 231

The average age was 22 years and 9 months.

REGULAR FIRST-YEAR STUDENTS.

PERIOD OF LIFE.	1910-1911.		1911-1912.	
	Half-year Groups.	Yearly Groups.	Half-year Groups.	Yearly Groups.
16 to 16½ years . . . . .	—	—	—	—
16½ to 17 “ . . . . .	2	2	3	3
17 to 17½ “ . . . . .	12	—	16	—
17½ to 18 “ . . . . .	30	42	31	47
18 to 18½ “ . . . . .	60	—	48	—
18½ to 19 “ . . . . .	43	103	57	105
19 to 19½ “ . . . . .	47	—	61	—
19½ to 20 “ . . . . .	24	71	35	96
20 to 20½ “ . . . . .	20	—	20	—
20½ to 21 “ . . . . .	15	35	11	31
21 to 22 “ . . . . .	17	17	7	7
	270	270	289	289

Repeating the first year . . . . . 13  
 Students of unusual age . . . . . 10  
 Average age, omitting these 23 . . . . . 18 years, 10 mos.

GRADUATES BY YEARS AND COURSES.

YEAR.	Civil Engineering.	Mechanical Engineering.	Mining Engineering and Metallurgy.	Architecture.	Chemistry.	Electrical Engineering.	Natural History or Biology.	Physics.	General Course.	Chemical Engineering.	Sanitary Engineering.	Geology.	Naval Architecture.	Electro-chemistry.	Total.	Degrees Granted by Decades.
1868	6	1	6	—	—	—	—	—	1	—	—	—	—	—	14	
1869	2	2	—	—	—	—	—	—	—	—	—	—	—	—	5	
1870	4	2	2	—	1	—	—	—	1	—	—	—	—	—	10	29
1871	8	2	5	—	2	—	—	—	—	—	—	—	—	—	17	
1872	3	1	5	—	3	—	—	—	—	—	—	—	—	—	12	
1873	12	2	3	1	7	—	—	—	1	—	—	—	—	—	26	
1874	10	4	1	1	—	—	—	—	2	—	—	—	—	—	18	
1875	10	7	6	1	1	—	—	1	2	—	—	—	—	—	28	
1876	12	8	8	—	5	—	2	3	4	—	—	—	—	—	42	
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	3	1	—	—	—	1	—	—	—	—	—	8	225
1881	3	5	6	3	8	—	1	—	2	—	—	—	—	—	28	
1882	2	5	5	3	6	—	1	1	1	—	—	—	—	—	24	
1883	3	7	5	1	3	—	—	—	—	—	—	—	—	—	10	
1884	5	6	13	—	12	—	—	—	—	—	—	—	—	—	36	
1885	4	7	8	2	4	2	—	—	1	—	—	—	—	—	28	
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	14	24	5	5	8	17	1	1	2	—	—	—	—	—	75	
1890	25	28	5	5	13	18	3	2	6	—	—	—	—	—	103	507
1891	18	26	4	6	11	23	3	3	1	7	—	1	—	—	103	
1892	22	26	5	13	7	36	6	1	7	4	6	1	—	—	133	
1893	25	30	5	2	8	41	2	—	6	8	—	2	—	—	120	
1894	21	31	3	14	11	33	1	3	5	12	3	—	—	—	138	
1895	25	30	3	15	14	33	—	2	4	11	4	—	5	—	144*	
1896	26	34	10	24	17	48	3	3	7	7	4	—	—	—	100*	
1897	25	40	7	16	20	33	2	3	7	12	4	1	9	—	179	
1898	32	41	7	29	25	33	3	4	6	9	3	—	—	—	199	
1899	30	37	9	22	22	32	2	2	1	10	1	—	8	—	173*	
1900	32	34	21	21	19	23	3	3	5	11	4	—	9	—	185	1,573
1901	37	39	18	21	17	25	1	1	6	14	4	1	16	—	200	
1902	24	46	14	18	14	35	5	3	3	9	7	—	14	—	192	
1903	26	37	27	15	13	39	1	3	1	10	4	1	17	1†	190	
1904	34	45	32	24	15	34	3	5	5	7	2	1	17	8†	232	
1905	46	54	26	12	23	31	3	—	3	13	5	1	24	3†	244	
1906	47	69	38	22	21	37	2	4	—	10	6	—	19	3†	278	
1907	37	52	22	21	10	32	—	—	—	14	3	2	10	5†	208	
1908	48	61	19	19	16	38	4	—	—	15	2	—	5	2†	229	
1909	51	41	30	18	12	42	5	3	—	13	9	—	5	3	232	
1910	57	57	24	18	10	36	3	—	2	18	12	—	11	3	251	2,256
1911	46	49	17	10	12	49	1	1	2	19	15	—	6	5	231*	
Totals	891	1,071	457	395	426	805	67	55	100*	233	98	14	182	33	4,821*	
Names counted twice, students graduating in two different years. . . . .															20*	
Bachelors of Science. . . . .															4,801*	
Masters of Science, not included in the above. . . . .															65	
Doctors of Philosophy and of Engineering, not included in the above. . . . .															2	
Total. . . . .															4,868*	

\* Deducting names counted twice (students graduating in two courses).  
 † Prior to 1909 this Course was designated as Option 3 of Course VIII. (Electro-chemistry).

STATISTICS OF GRADUATION, CLASS OF 1911.

Number receiving degree at end of one year . . . . .	2
“ “ “ “ “ two years . . . . .	36
“ “ “ “ “ three “ . . . . .	24
“ “ “ “ “ four “ . . . . .	134
“ “ “ “ “ five “ . . . . .	36*
<hr/>	
Total number of degrees of S. B. awarded . . . . .	232
Number entering from other colleges . . . . .	70
“ of graduates among these . . . . .	34
“ of non-graduates among these . . . . .	36

\*Including names counted twice.

FURTHER STATISTICS OF THE STUDENTS FROM OTHER COLLEGES OF THE GRADUATING CLASS, JUNE, 1911.

<i>Yrs. at the Inst.</i>	<i>Graduate.</i>	<i>Non-Graduate.</i>	<i>Total.</i>
1	2	0	2
2	26	10	36
3	6	17	23
4	0	5	5
5	0	4	4
	<hr/>	<hr/>	<hr/>
	34	36	70

SUMMER SCHOOL.

	1910.	1911.
Number from other colleges and schools attending . . . . .	45	49
Number not referring to any other school or college . . . . .	1	2
Number from Massachusetts Institute of Technology . . . . .	193	228
	<hr/>	<hr/>
	239	279
Number who registered but did not attend . . . . .	6	10
Number who applied but cancelled registration . . . . .	5	2
Registrations for failures or deficiencies . . . . .	194	190
Registrations to anticipate work . . . . .	255	324
Number who attended Summer School but did not return for Registration . . . . .	47	52

NUMBER OF STUDENTS REGISTERED IN EACH OF THE COURSES OF THE SUMMER SCHOOL FOR THIS YEAR AND THE YEAR BEFORE.

	1910.	1911.		1910.	1911.
Alternating Currents . . . . .	0	9	Metal Turning . . . . .	3	6
Carpentry . . . . .	23	18	Organic Chemical Laboratory . . . . .	9	7
Chemistry, Inorganic and Analytical . . . . .	40	49	Pattern Work . . . . .	3	9
Chipping and Filing . . . . .	4	3	Physical Laboratory . . . . .	18	9
Descriptive Geometry . . . . .	35	27	Physics . . . . .	26	25
English . . . . .	4	12	Precision of Measurements . . . . .	7	5
Field Geology . . . . .	2	0	Shades and Shadows . . . . .	2	5
Fire Assaying . . . . .	0	5	Structures . . . . .	7	10
Forging . . . . .	3	5	Surveying . . . . .	8	34
French . . . . .	3	8	Wood Turning . . . . .	3	10
German . . . . .	17	18			
Machine Tool Work . . . . .	21	18			
Mathematics (1) . . . . .	32	22			
Mathematics (2) . . . . .	15	22			
Mathematics (3) . . . . .	0	2			
Mechanical Drawing . . . . .	11	9			
Mechanism . . . . .	15	16			



RESIDENCE OF STUDENTS.

NUMBER OF STUDENTS IN EACH YEAR, FROM 1902, COMING FROM EACH STATE OR TERRITORY.

STATES AND TERRITORIES.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.
<i>North Atlantic.</i>	1,247	1,178	1,189	1,080	1,025	1,049	1,116	1,126	1,118	1,152
Connecticut . . . . .	43	44	48	50	36	29	31	32	33	45
Maine . . . . .	35	34	26	22	18	23	22	20	24	25
Massachusetts . . . . .	935	869	889	807	764	781	839	852	840	860
New Hampshire . . . . .	34	23	36	32	26	27	24	27	27	29
New Jersey . . . . .	8	13	16	11	15	17	14	14	18	33
New York . . . . .	96	104	94	71	84	82	99	99	106	90
Pennsylvania . . . . .	44	52	56	58	55	57	53	46	37	39
Rhode Island . . . . .	40	28	19	24	23	28	28	30	27	25
Vermont . . . . .	12	11	5	5	4	5	6	6	6	6
<i>South Atlantic.</i>	73	63	52	53	52	48	51	44	41	49
Delaware . . . . .	4	3	2	1	2	1	—	1	—	1
Dist. of Columbia . . . . .	17	15	17	13	12	10	10	8	5	13
Florida . . . . .	2	2	4	3	3	3	6	5	1	2
Georgia . . . . .	6	4	6	8	4	2	3	4	5	3
Maryland . . . . .	27	25	18	19	17	18	17	12	14	8
North Carolina . . . . .	6	7	1	—	1	—	1	—	—	1
South Carolina . . . . .	4	—	—	1	3	2	—	2	1	3
Virginia . . . . .	7	7	4	7	8	9	11	10	12	15
West Virginia . . . . .	—	—	—	1	2	3	3	2	3	3
<i>South Central.</i>	27	33	33	30	32	36	38	37	37	48
Alabama . . . . .	1	1	1	1	2	4	3	5	4	6
Arkansas . . . . .	1	1	—	1	—	1	1	2	2	2
Kentucky . . . . .	11	9	8	5	5	5	4	4	2	8
Louisiana . . . . .	2	2	5	1	—	—	3	2	5	4
Mississippi . . . . .	—	4	4	4	5	3	3	3	6	8
Tennessee . . . . .	3	5	2	2	3	6	8	8	5	3
Texas . . . . .	9	11	13	16	15	16	16	13	13	17
<i>North Central.</i>	173	155	168	174	153	142	121	123	140	141
Illinois . . . . .	49	44	43	42	37	31	23	24	33	30
Indiana . . . . .	14	6	10	10	15	12	9	11	10	9
Iowa . . . . .	8	6	9	13	14	16	14	5	4	9
Kansas . . . . .	1	1	4	7	6	5	4	6	9	7
Michigan . . . . .	10	9	9	10	7	8	7	10	9	9
Minnesota . . . . .	10	9	11	13	14	8	8	10	8	7
Missouri . . . . .	20	22	25	29	17	14	6	7	13	12
Nebraska . . . . .	5	4	5	4	2	3	2	4	6	8
North Dakota . . . . .	1	1	1	—	3	4	3	3	3	3
Ohio . . . . .	43	37	35	34	30	26	30	27	33	37
South Dakota . . . . .	1	3	2	—	1	3	3	5	3	2
Wisconsin . . . . .	11	13	14	12	7	12	12	11	9	8
<i>Western.</i>	39	46	54	55	52	49	54	59	53	57
Arizona . . . . .	—	—	—	—	—	—	—	—	1	1
California . . . . .	15	19	18	23	21	14	20	25	21	23
Colorado . . . . .	10	11	16	17	12	10	5	6	9	11
Idaho . . . . .	—	—	—	—	—	—	1	—	—	—
Montana . . . . .	3	2	5	3	3	3	2	3	2	2
Nevada . . . . .	—	—	—	1	1	1	1	—	—	—
New Mexico . . . . .	1	1	2	—	—	1	1	1	—	—
Oklahoma . . . . .	—	—	—	—	—	1	1	—	—	—
Oregon . . . . .	4	7	8	5	2	3	4	7	8	11
Utah . . . . .	2	3	3	2	3	3	5	5	3	3
Washington . . . . .	3	3	2	2	5	12	13	11	9	6
Wyoming . . . . .	1	—	—	2	5	1	1	1	—	—

	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.
DISTRICT.	2	3	9	8	7	6	9	11	15	11
Canal Zone . . . . .	—	—	—	—	—	—	1	1	1	—
Hawaii . . . . .	—	1	1	1	2	2	1	2	2	3
Philippine Islands . . . . .	—	—	4	2	3	1	1	1	4	3
Porto Rico . . . . .	2	2	4	5	2	3	6	7	8	5
Total for the United States . . . . .	1,561	1,478	1,505	1,400	1,321	1,330	1,389	1,400	1,404	1,458

NUMBER OF STUDENTS IN EACH YEAR, FROM 1902, COMING FROM EACH FOREIGN COUNTRY.

	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.
FOREIGN COUNTRIES.	47	50	56	66	76	80	72	79	102	101
Argentine Republic . . . . .	—	—	—	—	1	2	2	4	5	2
Armenia . . . . .	—	1	1	3	2	2	2	—	—	—
Australia . . . . .	2	3	1	3	3	3	—	—	2	1
Austria . . . . .	—	—	—	—	—	—	—	—	—	1
Belgium . . . . .	—	—	—	—	1	1	—	—	—	—
Bermuda . . . . .	1	1	—	1	1	—	—	—	—	—
Brazil . . . . .	5	3	3	1	—	2	3	1	2	3
Bulgaria . . . . .	—	—	—	—	—	—	—	1	—	—
Canada . . . . .	13	14	13	12	15	9	15	20	18	19
Cape Colony . . . . .	—	—	—	—	1	1	1	—	—	1
Central America . . . . .	—	—	1	—	—	—	—	—	—	—
Chile . . . . .	1	1	1	2	1	1	1	1	3	1
China . . . . .	1	2	8	8	7	9	10	11	27	36
Costa Rica . . . . .	—	—	—	—	—	2	3	2	1	1
Cuba . . . . .	2	3	4	4	4	4	2	7	5	3
Denmark . . . . .	1	1	1	1	1	1	—	—	1	1
Ecuador . . . . .	—	—	1	1	2	2	2	1	1	1
Egypt . . . . .	—	—	—	1	2	2	2	1	1	2
England . . . . .	3	4	4	5	6	4	3	—	1	1
Finland . . . . .	—	—	—	—	—	—	—	—	1	—
France . . . . .	—	—	1	1	—	—	—	—	2	2
Germany . . . . .	1	2	—	—	—	—	—	1	1	2
Greece . . . . .	—	—	—	—	—	—	—	—	—	1
Honduras . . . . .	—	—	—	—	1	—	1	3	3	2
India . . . . .	—	1	1	2	1	1	2	1	—	—
Ireland . . . . .	1	1	—	2	2	3	1	—	—	—
Italy . . . . .	—	—	—	2	—	2	1	1	1	—
Jamaica . . . . .	—	—	1	—	1	—	1	1	1	1
Japan . . . . .	1	2	1	3	5	3	4	4	4	3
Korea . . . . .	—	—	2	—	—	—	—	—	—	—
Malta, Island of . . . . .	—	1	1	—	—	—	—	—	—	—
Mexico . . . . .	10	8	4	7	12	12	6	10	9	5
Newfoundland . . . . .	—	—	—	—	—	—	—	—	—	1
New Zealand . . . . .	—	—	—	—	—	—	—	1	1	2
Norway . . . . .	—	—	—	—	—	—	—	—	1	—
Panama . . . . .	—	—	—	—	—	1	—	—	—	—
Paraguay . . . . .	—	—	—	—	—	—	1	1	1	1
Peru . . . . .	—	—	—	1	1	2	2	1	2	1
Poland . . . . .	—	—	—	—	—	1	—	—	—	—
Russia . . . . .	—	—	—	—	—	2	2	2	2	3
Scotland . . . . .	1	1	2	1	1	1	—	—	0	0
Sweden . . . . .	—	—	1	—	—	—	—	—	—	—
Switzerland . . . . .	—	—	—	—	—	—	—	1	1	1
Syria . . . . .	—	1	1	—	—	—	—	—	1	2
Transvaal . . . . .	—	—	1	3	3	3	2	1	2	—
Turkey . . . . .	—	—	2	1	1	2	1	2	2	1
Uruguay . . . . .	4	—	—	2	1	1	1	—	—	—
Total in school . . . . .	1,608	1,528	1,561	1,466	1,397	1,410	1,461	1,471	1,506	1,559

RESIDENCE OF STUDENTS FOR THIS SCHOOL YEAR.

STATES AND DISTRICTS.	Candidates for Advanced Degrees.								Total.	STATES AND DISTRICTS.	Candidates for Advanced Degrees.								Total.
	Fourth Year.	Third Year.	Second Year.	First Year.	Classified.	Unclassified.	Special.	Total.			Fourth Year.	Third Year.	Second Year.	First Year.	Classified.	Unclassified.	Special.	Total.	
Alabama	1	1				2	4	6	Vermont		1	1	2		4	2	6		
Arizona		1		1		1		1	Virginia	1	3	3	2		9	4	15		
Arkansas		1						1	Washington		3	1			4	2	6		
California	3	2	1	3	11	6	6	23	W. Virginia		1	1			2	1	3		
Colorado		2		1	6	5	9	11	Wisconsin	1	2	1	1		6	2	8		
Connecticut		9	7	5	14	35	9	45	<b>Total</b>	<b>32</b>	<b>261</b>	<b>240</b>	<b>239</b>	<b>302</b>	<b>1,075</b>	<b>319</b>	<b>64</b>	<b>1,458</b>	
Delaware		1	1	1	1	1		1	<i>Foreign Countries.</i>										
Dist. of Co'bia.	1	1	1	1	3	7	5	13	Argentina		1	1			2		2		
Florida					1	1	1	2	Australia			1			1		1		
Georgia		1			2	3		3	Austria			1			1		1		
Hawaii							2	3	Brazil					3			3		
Illinois	1	10	2	5	19	10	1	30	Canada	4	2	1	2	1	10	7	19		
Indiana	1	2	2	5	5	3	1	9	Cape Colony				1		1		1		
Iowa	2	3	1		6	2	1	9	Chili				1		1		1		
Kansas	2	1	1	1	5	2	1	7	China			2	8	9	1	20	16	36	
Kentucky		3	1	1	2	6	1	8	Costa Rica			1			1		1		
Louisiana	1	1	1	1	3	1	4	5	Cuba			1	1		2	1	3		
Maine	1	7	1	3	5	17	4	25	Denmark	1					1		1		
Maryland		3	2	2	8			8	Ecuador							1	1		
Massachusetts	6	144	137	167	216	670	163	27	860	Egypt			1			1	1	1	
Michigan		4	1	1	6	3		9	England				1		1		1		
Minnesota	1	1	1	3	5	2	7	7	France			1		1	2		2		
Mississippi	1	1	1	1	2	4	1	7	Germany							1	1	2	
Missouri	2	3	5		10	2		12	Greece		1				1		1	2	
Montana	1	1			2			2	Honduras		2				2		2		
Nebraska		1	3	2	2	8		8	Jamaica		1				1		1		
N'w Hamps're		4	9	3	21	7	1	29	Japan		2				2	1	3		
New Jersey		8	4	3	25	23	8	33	Mexico			2	2		4		4		
New York	1	21	16	12	14	64	22	40	Newfoun'nd			1			1		1		
No. Carolina	1	1			1			3	NewZealand		1		1		2		3		
No. Dakota					1			1	Paraguay					1	1		1		
Ohio	1	6	12	4	3	26	11	37	Peru		1				1		1		
Oregon			1	2	3	6	2	11	Russia		1			2	3		3		
Pennsylvania	2	6	10	4	3	25	12	39	Switzerland							1	1		
Phil. Islands				1	1			3	Syria			1	1		2		2		
Porto Rico		2	1	1	1	4	1	5	So. Africa						1		1		
Rhode Island	2	3	1	6	7	19	5	25	Turkey				1		1		1		
So. Carolina	1					3		4	<b>Total</b>	<b>5</b>	<b>18</b>	<b>17</b>	<b>19</b>	<b>10</b>	<b>69</b>	<b>29</b>	<b>3</b>	<b>101</b>	
So. Dakota				1		1		2											
Tennessee		1	1			2	1	3											
Texas			5	2	3	10	7	17											
Utah		1	1			2	1	3											

RESIDENCE OF MASSACHUSETTS STUDENTS.

COUNTY.	No. of Towns.	No. of Students.	COUNTY.	No. of Towns.	No. of Students.
Barnstable	6	8	Middlesex	37	257
Berkshire	5	10	Nantucket		
Bristol	9	19	Norfolk	26	96
Dukes	3	6	Plymouth	18	38
Essex	25	123	Suffolk	5	255
Franklin	3	3	Worcester	9	17
Hampden	5	24	<b>Total</b>	<b>155</b>	<b>860</b>
Hampshire	4	4			

## MASSACHUSETTS CITIES WHICH SEND FIVE OR MORE STUDENTS.

Boston . . . . .	243	Salem . . . . .	8
Cambridge . . . . .	37	Wakefield . . . . .	8
Newton . . . . .	37	Wollaston . . . . .	7
Brookline . . . . .	28	Haverhill . . . . .	6
Newburyport . . . . .	23	Holyoke . . . . .	6
Somerville . . . . .	23	Manchester . . . . .	6
Lawrence . . . . .	20	Quincy . . . . .	6
Malden . . . . .	18	Weymouth . . . . .	6
Lynn . . . . .	17	Andover . . . . .	5
Springfield . . . . .	15	Auburndale . . . . .	5
Waltham . . . . .	15	Bridgewater . . . . .	5
Medford . . . . .	14	Concord . . . . .	5
Melrose . . . . .	13	Dedham . . . . .	5
Everett . . . . .	11	Lowell . . . . .	5
Brockton . . . . .	10	Natick . . . . .	5
Winchester . . . . .	10	Taunton . . . . .	5
Lowell . . . . .	9	Watertown . . . . .	5
Beverly . . . . .	8	Wellesley . . . . .	5
Braintree . . . . .	8	Woburn . . . . .	5
Framingham . . . . .	8		

WALTER HUMPHREYS,  
*Registrar and Recorder.*

## Reports of Departments.

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### DEPARTMENT OF CIVIL AND SANITARY ENGINEERING.

The most important event of the year for the Department has been the acquisition of land for a summer course of Surveying near the coast village of East Machias, Maine, at a distance from Boston of 350 miles, with through train service in twelve hours. The camp site is about four miles from the village and comprises slightly more than seven hundred acres of land in the form of a strip varying in width from one-fourth to one mile with a shore line of three miles on Gardner's Lake, a beautiful sheet of water of about nine square miles in area. The location chosen for the buildings is on a high gravelly bluff adjoining the lake, the immediate vicinity of which is entirely unsettled.

The principal structure which is now under construction is to consist of a central administration building containing lecture rooms, offices, a few sleeping rooms, and a lounge room. On either side of the central building are one story wings, one of which contains a large drafting room, and the other a dining room, kitchen, ice house and lavatories. The sleeping quarters of the students and bachelor members of the instructing staff will probably be in tents located near the main building. It is hoped that permanent houses in the immediate vicinity will be provided for the married instructors who may wish to have their families with them during the camp season.

It is proposed to give at this camp practically all the field work required in Courses I and XI, and the surveying required in Course III. A brief course in the use of surveying instruments will, however, be given in Boston in the

sophomore year. The camp season will last from the first of August to the middle of September, and attendance of students in the period between the sophomore and junior year will be compulsory. The elimination of the field work from the work of the regular school year will permit the courses affected to be materially broadened in scope and increased in efficiency.

It should be noted that the effect of the establishment of this compulsory summer course is to lengthen the period of instruction for students in the three courses affected, and to increase their expenses somewhat although no additional tuition will be charged. The Department, however, is fully confident that attendance in these courses will not be decreased by this action and that the increased efficiency of the graduates will repay many times over this additional expenditure of time and money.

The Department wishes to express its gratitude to the graduates of Course I composing the Alumni Committee upon the Summer Camp, Messrs. Metcalf, Bemis and Fay, whose efforts made possible the establishment of the camp, and to Mr. Charles W. Eaton of the class of 1885 for his generous gift of \$10,000 for its equipment. Thanks are also due to Mr. George F. Cary of East Machias for his voluntary and invaluable assistance in securing titles to the many parcels of land involved, and to the late E. P. Gardner also of East Machias for similar assistance.

The optional summer course of Surveying which has been given in alternate years for some time past was held during the summer at East Machias, near the site selected for our permanent camp. The school was under the direction of Professor Robbins who was assisted by Professors Breed, Hosmer and Russell, and Messrs. Manley and Parker of last year's graduating class, and now assistants in the Department. The school was attended by twenty-two students, and a portion of the work consisted of the topographical survey of the site of the new camp.

The desire of Professor Allen to be relieved from the administrative duties which he has so successfully conducted during the last two years, and the appointment of Professor Spofford as head of the Department, brings the form of Department organization essentially back to that formerly existing, but does not interfere with the harmonious co-operation which previously existed amongst the professors and instructors of the various branches of civil engineering.

Other changes in the staff during the year consist of the resignation of seven assistants who left to engage in active practice; namely, Messrs. Walter W. Clifford, Frank S. Lovewell, Morse W. Rew, Walter K. Brownell, Eldon S. Clark, Ralph W. Horne and John P. Wentworth. The following five new assistants have been appointed: Messrs. Howard P. Ireland, Harry L. Manley, Ibrahim F. Morrison, Theodore B. Parker and Edwin C. Vose. It will be noticed that this reduces the total number of assistants from eight to six, a reduction made possible by the transfer of surveying to the Summer Camp.

The individual members of the instructing staff have as usual been engaged in professional practice to a reasonable extent during the year, thus keeping well informed as to the trend of engineering practice, and adding to their ability to inspire in our students a wholesome professional interest. In this connection, it may be interesting to note that much of this work has been done for the various municipalities of the state, members of the staff having been selected as consulting engineers upon important engineering problems by a considerable number of Massachusetts cities and towns, while others have been employed in the state service. While it is evident that outside professional work of this character may be overdone, I believe that a reasonable amount of it, particularly if conducted for the state or its municipalities, may advisedly be encouraged both for the good of the Institute and for the

public service. It has also the important advantage of permitting us to retain in our service men of a higher order of ability than the low salaries paid by the Institute would otherwise command.

An interesting side-light upon this phase of our activities is afforded by the list of Members of the American Society of Civil Engineers which shows the Institute to have a much larger representation than any other college. As Members of this Society are chosen exclusively from those who have shown by years of practice the ability to construct and design engineering work, membership is an honor much sought for by the profession and establishes with reasonable conclusiveness the practical ability of its holders.

The activities of the instructing staff in other directions during the year is partially indicated by the titles in the list of Institute publications printed elsewhere in this report. Its members have also taken part in the activities of national and local engineering societies, and the Department was officially represented by Professor Breed at the first Annual Road Congress of the American Association for Highway Improvement at Richmond, Va., November 20th to 23rd of this year.

Professors Allen and Spofford spent the summer in Europe, the latter spending a considerable portion of his time in the examination of engineering construction in Italy, Germany and Holland, and in the inspection of the leading technical schools of the Continent. Mr. Rew, an assistant in the Department, made a trip of inspection to the Panama Canal during the early spring. This trip was made possible through the courtesy of Mr. Charles W. Eaton whose generosity in providing equipment for the Summer Camp has already been mentioned.

The number of fourth year and graduate students taking courses in the Department is the largest yet recorded. To accommodate this unusual number, additional space



for drawing desks was obtained in the fourth year drafting room by the removal of Professor Russell's office from one corner of the room to another location in Room 41, Engineering A. This latter room is now so crowded that it is impossible to satisfactorily display the many models and other interesting exhibits which it contains. Further increase in the number of senior and graduate students will result in serious overcrowding.

Intimate relations have been preserved during the year with practising engineers both amongst the alumni and others. Especial thanks are due to Messrs. Sanford E. Thompson, Frederic H. Fay, Charles R. Gow and Henry E. Warren who have voluntarily given series of lectures to our classes upon special features of engineering practice, and to the Proprietors of Locks and Canals on the Merrimack River for the use of the canals at Lowell for stream gaging. Mention should also be made of the gift to the Institute by the heirs of the late William Jackson, City Engineer of Boston for many years, of his valuable library of civil engineering works.

No permanent equipment has been added during the year except as necessary to properly provide for the gradually increasing number of students taking the fourth year course in stream gaging, and to make up for breakage and general depreciation in rods, tapes and other minor pieces of apparatus.

In conclusion it may be stated that the Department is in a generally prosperous condition, and that we look forward to a marked increase in efficiency resulting from the transfer of field work to the summer.

CHARLES M. SPOFFORD.

**DEPARTMENTS OF MECHANICAL ENGINEERING,  
APPLIED MECHANICS AND MECHANIC ARTS.**

Professor Lanza, who for many years has had charge of the Department, has been made Professor Emeritus and Professor Schwamb, on account of impaired health, has felt it best to give up active work in the Department. Their retirement has necessitated a number of important changes.

In 1883 Professor Lanza, then in charge of the Department of Applied Mechanics, undertook the direction of the Department of Mechanical Engineering and under his guidance the Department has grown to its present proportions and high standing. Professor Lanza was one of the first to apply scientific methods to many of the problems which the mechanical engineer had to solve. He was also one of the first to point out the necessity of testing the strength of full-sized specimens, and to give to engineers, through the results of his own experiments on the strength of materials, accurate data for use in their engineering computations.

Professor Schwamb came to the Institute at the time that Professor Lanza took charge of the Department. The growth of the courses in Mechanism, Machine Design, Mill Engineering and Industrial Management to their present importance is due largely to his energy. He also, from 1883, had sole charge of the courses in Mechanic Arts, which under his supervision have become very valuable to students taking certain branches of engineering.

The Department feels greatly the loss of two such men as these, but as Professor Lanza had always planned the organization to meet emergencies, it has been possible by a reassignment of subjects among other members of the staff to carry along successfully, as we believe, all of the work.

The class work in Applied Mechanics has been taken by Professors Fuller and Johnston who have in turn given up some of their classes to Professor Hayward and to Messrs. Smith and Holmes. The Applied Mechanics Laboratory has been put under the direction of Professor Hayward. The classes in Dynamics of Machinery have been taken by Professor Riley who has been relieved of some of his work in Heat Engineering, which is transferred to Professor Berry. The work in Machine Design and Mill Engineering has been taken by Professor Haven. The courses in Industrial Management by Professor Park, and that in Locomotive Engineering by Professor Fuller.

The Mechanical Laboratories have now been associated with the Department of the Mechanical Engineering and Professor Park has been chosen to act as the director.

The Department has recently submitted to the Faculty a new schedule of studies for the Course. In general, the changes proposed consist of a reduction in the time given to Carpentry, Wood Turning, Forging, Chipping and Filing and Machine Tool work; a considerable reduction in the time given to the Locomotive, Marine, and Mill Options, and the dropping of the Option in Heating and Ventilation. The time released by these reductions it is proposed to utilize in part by increasing the number of hours assigned to some of the important subjects now in the Course, and in part for new subjects which are to be added.

The new schedule provides for an increase in the hours allotted to the Mathematics of the third year, this time to be devoted to additional problem work; for an increase of fifty per cent. in the time given to Theoretical Hydraulics and for the substitution of Hydraulic Engineering for Hydraulic Motors, this course to include in addition to Hydraulic Motors, some work on the estimation of water power; for an increase in the number of lectures in Industrial Management, and for an increase in the time devoted to Physical Laboratory. The schedule calls for the sub-

stitution of a new course called "Mechanism of Machinery," to be given in the third year in place of what is now known as Machine Tools and Cotton Machinery, the course to include applications of mechanisms to many classes of automatic machinery as well as to machine tools and to cotton machinery; for the substitution of a course on the Physico-Chemical Properties of Iron and Steel, in place of Metallurgy of Iron; for a course in Heating and Ventilation to be given in the second term of the fourth year to all the students in place of the courses now given in the third year and in the Option; for the introduction of Factory Construction, a new course to be given in the first term of the Senior year; and also for a course in Refrigeration to come in the second term of the Senior year. In the past many students have taken the Mill Option solely for that part of the course relating to mill construction. This condition will be met in the future by the course in Factory Construction to be given by Professors Haven, Fuller and Hayward to all of the students in the Senior class of Course II. In the second term of the senior year fifteen hours are to be allowed for general lectures, many of which are to be given by practising engineers.

It is possible to take up the subject of Refrigeration with the third year class in the course in Heat Engineering only in the most general way. To meet the demand for additional instruction in this line, Professor Berry is now giving (as an elective) a course of fifteen lectures in which are discussed the heat transmission through insulations, air circulation and ventilation in storage warehouses, the thermodynamics of the carbonic acid system, the ammonia compression system, and the ammonia absorption system (including the thermodynamics of a binary mixture), and the subjects of fractional distillation and rectification and the liquifaction of gases. This course has been embodied in the list of subjects required under the new schedule.

Professor Riley is now giving (as an elective) a course

of fifteen lectures on the gas, oil, and gasoline engines. This course, which is open to all students who have had Heat Engineering, deals with the design, construction and operation of the smaller engines such as are used on yachts, aeroplanes and automobiles.

Every member of the Department feels that a more thorough grounding in the fundamentals and a broader knowledge of what might be called "general engineering" is of more value to a student than a thorough knowledge of the detail of some one of the options.

The Institute was one of the first among technical schools to give systematic instruction in the Mechanic Arts. The aim has always been first to teach the students the methods of doing work and afterwards to give them in as short a time as possible sufficient practice to make them familiar with the applications of these methods. The courses in Mechanic Arts although somewhat shortened in the new schedule will still be of sufficient length to accomplish the object sought.

During the past year the Department has had presented by the Schutte Koerting Co. an 8" Eductor Condenser. Mr. Alfred W. French '89, president of the French Oil Mill Machinery Co., has made for and given to the testing laboratory a hydraulic accumulator with  $4\frac{1}{2}$  inch plunger, 60 inch stroke, designed for 1700 pounds pressure per square inch.

The Department has been loaned through the courtesy of Mr. Leonard F. Myers, a Luitweiler Pump which is now being installed; Mr. George F. Whipple of the Hendrick's Commercial Register has presented to the Mechanical Laboratories a cabinet system of cataloguing and commercial register; the Autogenous Welding Co. of Springfield, Mass., has loaned to the Mechanical Laboratories an Oxy-Acetylene welding and cutting outfit.

The Cement Testing Laboratory has been rearranged so that twice the number of students can be accommodated.

A new Fairbanks cement testing machine, four sets of standard six-gang cement molds and also a set of ball-and-socket tension holders, and two sets of extensometer apparatus, have been added to the equipment in this laboratory. These latter have been built by the machinist from designs made by the instructing staff. Designs have also been made for a new wire testing machine of two tons capacity, including a set of special grips. This machine is to be built by the machinist during the coming year.

The Mechanical Department of the Worcester Polytechnic has offered the Institute the use of a whirling table, designed for testing aeroplane propeller blades and two of our students are to make use of this apparatus in carrying out the work on their thesis.

There have been but few changes in the equipment of the Mechanical Laboratories during the past year. Two new engine lathes and some small tools have been purchased. Since the introduction of Mr. Smith's new textbook on machine work it has been noticed that the students ask fewer questions and that less time is required by the instructor in the general explanation given in the lecture room, thus making available at each exercise more time for work with the tools. The course given under the heading "Chipping & Filing" includes considerable work of a different nature such as pipe fitting, brazing, auto-genous welding, belt lacing, scraping, and the use of pneumatic tools.

Although the course in Foundry work has been strengthened during the past year it is the intention of the Department to develop this branch still more, the new schedule of studies providing for a fifty per cent. increase in the time devoted to it.

The Department, subject to the consent of the Faculty, intends to offer special courses in the different branches of Mechanic Arts for teachers or others suitably prepared.

The new assistants engaged to replace those leaving are: Mr. Charles A. Robb, S.B., M.S., Mr. John S. Beamensderfer, A.M.M.E., Mr. Ralph G. Adams, S.B., Mr. Thomas H. Haines, S.B., Mr. Albert L. Gardner, S.B., Mr. Harry W. Waterfall, S.B., and Mr. Harry G. Davies and Mr. Harry M. Mosher in the Department of Mechanic Arts. Mr. Royal R. Heuter, who has been on leave of absence for two years, returns to the Department in February. He has spent the two years in the Technische Hochschule at Charlottenberg, where he has just received the degree of Doctor of Engineering.

EDWARD F. MILLER.

#### DEPARTMENT OF MINING ENGINEERING AND METALLURGY.

*Instructing Staff.*—Bert S. Wohlgemuth, S.B., Assistant in Metallurgy, has left the Institute to be with Mr. L. H. Underwood of the National Tube Company, Wheeling, West Virginia, where at present he occupies the position of Assistant Superintendent of the Blast Furnace Department. Mr. Marcus A. Grossmann, S.B., has taken his place at the Institute for the present year.

Last spring Mr. J. W. Paul of the United States Bureau of Mines gave a special lecture to our students on Mine Rescue Apparatus, in which the use of various types was demonstrated and the work of that branch of the bureau was illustrated by lantern slides.

*Course Scheme.*—The most noteworthy change in the curriculum during the past year has been that of the required Summer Course in Surveying which is to be held in conjunction with the Civil Engineers at the summer camp in Maine. The present second year class is advised to take this summer course, but later classes will be required to take it. The time gained from reducing the Surveying

of the second year has been applied to General Geology and Advanced German. All of the assaying work for students other than those in the Mining Course is now given in the first term while the second term work is devoted to students of this Department.

In the coming year instruction in Metallurgy of Iron and Steel, given at present to students in Courses II, III and XIII, will be confined to students in Course III. This will be of much benefit to the Department, as the Metallurgy of Iron and Steel can be brought into closer relation with the Metallurgy of the Non-Ferrous Metals, and with the study of General Metallurgy. With students of the single department taking the usual three courses in Metallurgy, it will be possible to break away from the generally accepted divisions of the subject and collate them as they ought to be. It will also be possible to bring the metallurgical and metallographical laboratories into closer relation with the classroom exercises.

This year the assaying classes are so large in the first term that we are working the maximum size of sections. If the numbers continue to increase we shall need more sections and additional instructors.

This year a larger number of men are entering Option 2. In the past we have had only one or two men a year in this Option and occasionally none.

*Advanced Students.*—This year the Department has four students taking advanced work in Metallurgy or Mining Engineering,—Mr. Emory M. Marshall, University of Wisconsin, and E. M., Colorado School of Mines; Mr. Boyd Dudley, M. S., Rolla, Missouri; Dr. Walter Fraenkel, Ph.D., Heidelberg, and Mr. W. Wanjukoff, Met. E. Tomsk. Mr. Marshall and Mr. Dudley are candidates for the Master of Science degree of the Institute, and the latter expects to work for the degree of Doctor of Philosophy next year. Messrs. Fraenkel and Wanjukoff have come from Germany and Russia respectively to study



our methods of instruction, especially the laboratory work. They expect to carry on some original research.

We have also undergraduates who have come to us this year with degrees from the Sheffield Scientific School, Drake, Princeton, Washington and Lee, and Harvard Universities.

*Summer School.*—During the past summer so many students were engaged in work in mines, mills and smelters that there was no call for a summer school in Metallurgy. A summer school in Assaying was held by the Department for the first time. Under the new arrangement of the course scheme there appears to be a greater demand for this summer course in Assaying and it is possible that it may be held every year.

*Positions for Students.*—The members of the graduating class were quickly and satisfactorily placed. The demand for young graduates is still greater than the supply. We were also able to secure, for all undergraduates who desired, positions where they could gain practical experience in mining work during the summer.

*Professional Work.*—Professor Richards spent the summer in part at Lake Superior and in part at Denver. He also has made a number of ore dressing tests some of which may be worthy of mention, for example, tests on the South African copper and gold ores, tests on graphite, on southern phosphate, on glass sand, Illinois coal, titanium ore, New York apatite, Virginia pyrite, Minnesota iron, Virginia iron, and a number of others.

Professor Hofman spent part of the summer holiday in France, Germany, Belgium and England. He visited a number of copper, lead, zinc and iron smelting plants and spent some time at the engineering schools of Aachen, Berlin, and Birmingham in order to gain information as to what is being done in the laboratories in the regular courses of instruction, and especially for the carrying on of independent research. These European laboratories do not

furnish the undergraduate students with the facilities that we do at the Institute, but lay more emphasis on the work of the graduate students. In the metallurgical laboratories to be erected on the new site of the Institute it is proposed to furnish not only all the facilities for research work, but to extend the field considerably from that of ore treatment to metal treatment.

Professor Hofman has had to investigate for one of our prominent mining companies the electric smelting of zinc ores, and is at work upon this subject at the present writing.

Professor Locke has devoted some time to professional trips and Professor Bugbee to the completion of his book on Fire Assaying.

*Thesis Work.*—Noteworthy theses of last spring which were of much value in solving problems for outside parties were: Killion and Osborn,—On the Concentration and Metallurgical Treatment of a Silver Ore from Cobalt, Ontario; Smith,—On the Effect of Heat Treatment on the Mechanical Properties and Resistivity of German Silver Resistance Wire; Greenan and Grossman,—On the 15-ton Heroult Electric Steel Furnace at Worcester; Vining and Weltmer,—On Pyritic Smelting. This last represents a step in the series of experiments made to adapt pyritic smelting to our little copper blast furnace, and it is expected that another thesis along this same line will be undertaken this year.

*The New Institute.*—Now that the new site seems settled the question of a new mining building has to be considered. The forty years spent in the development of our present laboratory should be invaluable in the designing of our new laboratories and we can probably avoid the mistakes which have been made in some cases where schools have had to design and install mining and metallurgical laboratories *de novo*. These mistakes appear to be of two classes. First, they have either given some mining machinery company a carte blanche order to supply a

laboratory and such a laboratory has been found later not to be well suited to educational needs. Second, some laboratories have been designed by men who have not had proper experience in teaching and these likewise too late have been found unsuitable. It is believed that the needs of the Mining Department for increased space should entitle it to early consideration and early construction on the new site so that it may be one of the first departments to be moved. Natural connections are with the Geological Department on one side, with the Heat Department on another side and with the Chemical Department on a third side. On his European trip this summer Professor Hofman gained valuable ideas in regard to the installation of a new metallurgical laboratory.

*Library.*—For years we have been trying to complete our set of the *Annales des Mines*. We have recently succeeded in doing this. We have now the *Journal des Mines* from 1796 to 1815, and the *Annales des Mines* from 1816 to date.

*New Apparatus.*—Owing to the unsettled condition of the Institute and to our crowded state we have not made many changes. Extensions have been made so that steam and hot water are now available from our little boiler during the summer months. Four No. 4 Becker short beam assay button balances have been bought to replace old balances which were no longer suitable for students work. The annular classifier has been remodelled to increase its capacity. The Ball Norton magnetic separator has been re-wired and supplied with a Simplex Electric Company rheostat. A new metallographical table has been built and the new horizontal polishing wheel is now run by a separate motor.

*Gifts.*—Professor Richards has presented to the library his complete set of the *Journal of the Society for the Promotion of Engineering Education*. He has also continued supplying the library with the *Proceedings of the Ameri-*

can Society for Testing Materials, and with the Mining and Scientific Press. He has also donated some miscellaneous books during the year and has had various pieces of apparatus for classifying and jiggling constructed which has been available for the use of the students. The Department has received through Mr. George C. Kaufman, a former student in Architecture and now head of the Guggenheim mining interests in Mexico, several shipments of lead and silver ore which will be of much value to us in our assay work. The Jamaica Copper Company has donated a large lot of copper ore which will be used in the metallurgical work. In addition we have fortunately been given various lots of ores which were originally sent to the members of the instructing staff for testing work. Professor Hofman has deposited in the library a number of pamphlets relating to metallurgical subjects. Mr. Hayward presented to the library a copy of Hayward-Hall's Translation of Borcher's "Huttenkunde." We have recently received a complete set of the fire clay crucibles made by the Denver Fire Clay Company which will be on exhibition in the Laboratory.

ROBERT H. RICHARDS.

#### DEPARTMENT OF ARCHITECTURE.

The Department of Architecture began the present school year unusually handicapped by the resignation of Professor Chandler, which was sent to the Executive Committee just before the opening of the term. Professor Chandler had endeared himself to every member of the Department, and his resignation was met with sincere regret on every side. It is a source of great satisfaction that the good health which Professor Chandler enjoys, his continued deep interest in the welfare of the Department, and his appointment as Professor Emeritus, will still keep him in close communication with Institute affairs,

and will enable us for many years to look to him for counsel. We therefore commence the school year full of hope and confidence that the prestige, the methods, traditions and wonderful "esprit de corps," developed during the twenty-three years of Professor Chandler's most able leadership, may be continued.

This year is a notable one regarding both the numbers and the strength of the students in the Department. The total registration in the second, third, fourth, and graduate classes is one hundred and fourteen, the same as last year, and continues the record then made of the largest enrollment in the history of the Department.

The class in Advanced Design is now larger than at any previous time. There are fourteen members in all, four candidates for the Master's degree, four candidates for the Bachelor's degree who anticipated Senior Design last year, and six special students. The class is of exceptional strength and promise.

The candidates for the Bachelor's degree number twenty-two. Ten of these are in the Architectural Engineering Option, and form the largest and perhaps the strongest class in its history.

In addition to four graduate students from our own Department, we have twenty-one students holding college degrees, besides twenty-four men who have had from one to three and a half years of college training. The mingling with our undergraduates of this class of men, as well as those coming for special work with two or more years of office experience, tends materially to broaden and mature the viewpoint of our students, and is a very real and beneficial factor in their development.

In the instructing staff of the Department Mr. Herbert E. Fowler, who resigned last spring to take a position with Purdy & Henderson, New York, has been replaced by Mr. Marcus M. Cory as half-time instructor in Architectural Engineering. Mr. Cory comes to us from the Department

of Civil Engineering, and has entered upon his work with most commendable interest and enthusiasm.

Mr. George H. Ingraham, a well-known Boston architect and a graduate of the Department with the Class of 1892, has taken charge of the course in Specifications and Working Drawings formerly given by Professor Chandler.

We are fortunate in being able to retain the partial services of Mr. L. Earle Rowe, Assistant in the Department of Egyptian Art at the Museum of Fine Arts, who was appointed last year to assist Professor Sumner in his courses in European Civilization and Art.

The new Course scheme adopted by the Faculty in 1909, and made possible by the omission of one year of Modern Language, for the first time becomes fully operative in all four years. We believe the course offered by each Option to be broader, more effective, and better balanced than ever before. Numerous minor changes have been made since the first adoption of the Course, all tending toward greater efficiency.

A short course in the senior year of Option II consisting of laboratory investigation of the materials and methods used in making Armored Concrete, in charge of Professor Hayward, followed by a brief course in the Design of Reinforced Concrete, by Mr. E. F. Rockwood, chief engineer of the New England Concrete Construction Company, introduced for the first time last year, fills a long-felt want in Option II, and enhances decidedly the strength of the Option. These courses were added to meet the demand that our structural men should be trained in at least the fundamental considerations pertaining to Design in Reinforced Concrete. Not a small number of the graduates of the Structural Option take positions in the west, where this material is being used in heavy construction to a far greater extent than in the east.

During the past year the Department has been the recipient of several gifts. His honor Mayor Fitzgerald

presented us with a small-scale plaster model of the Memorial Band-stand which is being erected on Boston Common in honor of the late George F. Parkman. It is of interest that the award for the design was made to Messrs. Derby, Robinson & Shepard, all former students of the Department.

Two reproductions of sketches by Prout were received from the late Mrs. William Barton Rogers.

The Architectural Society Scholarship Fund, founded in 1906, was made available for the first time this year by a gift of one hundred dollars from a former student, bringing the total amount of the Fund to something over one thousand dollars. The interest from this amount may now be used each year to help some deserving student.

Several "envois" have been received from Mr. I. P. Lord, '03, holder of the Rotch Travelling Scholarship three years ago. These are a welcome addition to our very valuable gallery of drawings.

A number of stereopticon slides of Italian gardens, a gift from Mr. Guy Lowell, a number of slides from Mr. S. E. Gideon, '06, and a subscription to the German periodical "Berliner Architekturwelt" from Mr. Kurt Vonnegut, '08, have been added to our library.

The \$1000 Travelling Fellowship, made possible this year by the interest from the Willard B. Perkins Fund, was awarded to Mr. Walter S. Davis, '10, in competition with five others. The jury of award consisted of Professor Duquesne, of Harvard University, and Mr. Stephen Codman in association with Messrs. Cox and Mead of the Department staff.

The Rotch Prize of two hundred dollars for the student in the regular course making the best record in four years, was divided between Messrs. John T. Arms, Jr., and William D. Foster; and the Prize of two hundred dollars for the special student making the best record in two years was divided between Messrs. Eduard H. Kruckemeyer and Albert McNaughton.

The two annual prizes of fifty dollars each given by the Boston Society of Architects were awarded to Ralph H. Doane, '12, and Mr. Freeman A. Pretzinger, special students.

The two "Class of 1904 Competition Prizes" of ten dollars each were awarded to Mr. Sidney L. Day, '12, and Miss Constance Fuller, special student.

It was announced at the recent reception to Professor Chandler by the Boston Society of Architects that a prize fund had been established in honor of Professor Chandler, to be known as the Francis Ward Chandler Prize, and to be given to students of the fifth year class in the Department.

The Architectural Society, the members of which are students of the Department of Architecture, exerts a very manly and helpful influence within the Department. The opportunities which it affords for bringing the students of the several classes into close comradeship, and for supplementing the regular instruction by lectures by professional men of prominence, are of inestimable value.

A new undergraduate society known as the Architectural Engineering Society, to be closely affiliated with the Architectural Society, has been founded since the opening of the term. It is believed that the two societies working in association will be productive of much benefit, and do much toward broadening the ideas of the students. It is of interest to note that members of the new society will be eligible to become members of both the Architectural Society and the Civil Engineering Society, and may exert some small influence in bringing into better appreciation of one another the two professions of Architecture and Civil Engineering.

Our quarterly publication, The Technology Architectural Record, has in its fourth volume materially strengthened its position as a recognized magazine. It continues to be the most acceptable means of keeping our alumni in touch



with the progress of the Department, thereby bringing to us indirectly many new students. The financial results of this last volume show a very gratifying decrease in the cost of the publication to the Institute. Its prospects for the future, both financially and otherwise, are much better than at the close of its third volume. We all agree as to its usefulness and effectiveness, and sincerely hope that it may be continued as a feature of our Department.

A matter which is at present arousing the keen interest of all members of the Department, and which if successfully carried out promises to be of much help to architectural education in general, is the proposed intercollegiate competition between the leading architectural schools of the east. The details of the plan are still under discussion, but in its essentials the proposition is to have at some stated date each year a single programme given simultaneously to the more advanced classes in Architectural Design at Harvard, Columbia, Cornell, Pennsylvania, and the Institute, to be attacked and solved exactly as though it were the regular work of each school; the results to be brought together in a joint exhibition to be judged by a competent jury; and the exhibit as a whole then sent from one school to another, affording an opportunity for the students of each school to gain ideas and inspiration from the work of the others. The competition is in no sense to be a competition between schools, and if properly managed, it can be made a tremendous factor for good in the general advancement of architectural education.

The large number of students in the Department is taxing our room capacity to its utmost. With the present large class in Advanced Design we find ourselves without proper accommodation for the "en loge" problems, which are such an important feature of the instruction in the subject.

We need a larger recitation room than we now have, fitted with drawing-tables and blackboard and a stereop-

ticon. The lantern being a necessary factor in the illustration of the courses in Second and Third-year Architectural History, Third, Fourth, and Fifth-year European Civilization and Art, and a useful adjunct to a number of other courses, it is with great difficulty that we can with our present equipment meet to the best advantage the requirements of tabular views and room schemes.

The unusually large classes just now bring heavy additional burdens upon the instructing staff. This is particularly felt in the Engineering Option, where we sorely need the addition of one man to the permanent membership of the instructing staff with the grade of Instructor.

The Department feels perhaps this year more than ever before the need of a permanent endowment that would permit it to continue without interruption the annual \$1000 Travelling Fellowship that has proved so successful during the years it has been offered. The income from the Willard B. Perkins Fund is available for this purpose every fourth year, including the year 1911-1912. This income enabled the Department last spring to hold the fellowship competition, with the result already stated in this report. During each of the three previous years a very generous gift from Mr. Guy Lowell, supplemented by an equal amount from the Corporation of the Institute, has furnished the means for offering the fellowship. It would be a matter greatly to be deplored should this fellowship lapse through lack of funds. Furthermore, in order that the fellowship may be made most effective, it should be advertised well in advance of the date for the competition. Therefore the Department must make the strongest possible appeal to the Corporation, none the less urgent because so often repeated, for an endowment of the fellowship which shall place it upon a permanent basis.

WILLIAM H. LAWRENCE.

**CHEMISTRY AND CHEMICAL ENGINEERING.**

During the past year, the Department has lost two members of its Instructing Staff who have been for many years important factors in its development and growth.

On the death of Mrs. Ellen H. Richards, on March 30, 1911, there ended a period of service to the Institute, to chemical and economic science and to mankind, which was distinguished by ability, enthusiasm, untiring energy and great self-sacrifice. Throughout the twenty-seven years of her official connection with the Staff of Instruction, she was an earnest, successful and inspiring teacher of the chemistry of sanitation, following closely its rapid development during that period. It is within bounds to assert that her laboratory has been for a number of years operated at the maximum possible efficiency with respect to equipment and space and it remains, in its unusual completeness, as a tribute to her ingenuity and constant thoughtfulness for the interests of the Institute. Scarcely less far-reaching than her service to the Institute as a teacher was her interest in the welfare of the women students in all departments. She was not only prodigal of counsel and encouragement and secured needed financial assistance from friends, but was herself generous to these young women and to the Department to a degree which will never be fully known.

The instructional work formerly cared for by Mrs. Richards has been placed in charge of Dr. John F. Morton, a graduate from our Course in Chemistry in 1906, who received his doctorate from the University of Chicago in September. He has been associated with Professor Edwin O. Jordan in work relating to problems of sanitation. Mr. Royce W. Gilbert is associated with Dr. Norton this year.

At the close of the year, Professor Fred L. Bardwell

resigned his position in the Department and accepted a professorship at Case School of Applied Science at Cleveland, Ohio. Professor Bardwell has been continuously associated with the work of our Department since his graduation in 1884, with the exception of a year spent in Germany on leave of absence. For most of that period he has had the direction of the whole, or a considerable portion, of the laboratory work given to first-year students in Chemistry and the Department is greatly indebted to him for the loyal, thoughtful and painstaking development of that branch of our work. This work is now in the charge of Professor Ellwood B. Spear.

The personnel of the Department has also undergone another important change in the retirement from active service of Mrs. Margaret E. Stinson who for forty-eight years has been associated with the distribution of supplies to students of chemistry in our laboratories. It would be difficult indeed to find a record of greater efficiency and devotion than that of Mrs. Stinson which has inspired the respect and affection of all who have known her. It is a pleasure to note that the Institute and her friends are uniting in providing for her comfort.

Mr. William T. Hall and Dr. Robert S. Williams, Instructors in Analytical Chemistry, have been promoted to Assistant Professorships on the basis of efficient service. Professor W. H. Walker was granted, in June, leave of absence for a half-year and Professor W. K. Lewis is in charge of his work meanwhile, assisted by Mr. R. E. Gegenheimer as Instructor in Industrial Chemistry. While Dr. Walker's request for the leave of absence was occasioned by a slight nervous over-strain, it is a satisfaction to state that there is every reason to expect that he will return in the second half of the year in full vigor.

The staff has been strengthened by the appointment of Paul S. Fiske, D. Sc., and Edward Mueller, Ph. D., as Instructors in Inorganic Chemistry. Dr. Fiske, a graduate

of Harvard, was formerly assistant with us in the same subject and subsequently spent two years in study at Heidelberg and Zürich, as Dalton Fellow from the Institute, receiving the degree of "Doktor der Naturwissenschaften" at Zürich. Dr. Mueller received his doctorate at Harvard and has taught successfully at Washington University and Tufts College. Both these young men bring much enthusiasm and earnestness to their instructional work. Mr. Eugene L. Connolly has also been promoted to be instructor in Inorganic Chemistry and Mr. Ludwig Rosenstein to be Instructor in Theoretical Chemistry, both for merit.

It has again been made possible, through the liberality of Professor Moore, to employ a Research Assistant in Organic Chemistry, to work under his direction, and Miss Ruth M. Thomas was reappointed for this year. A second Research Assistant in Organic Chemistry, to work under the direction of Professor Mulliken, the expenses to be met from a special fund, the result of research work of last year, has been authorized, and Miss Florence C. Sargent appointed to the position.

During the past year the revised third-year schedule of the Course of Chemistry and the second-year schedule of the Course of Chemical Engineering have been put into effect with generally satisfactory results. The full success of the plans is somewhat curtailed by the present necessity for simultaneous subdivision of the classes among several laboratory subjects which results in broken time. Professor Warren K. Lewis has offered some additional optional lecture courses to students of Chemical Engineering of much interest and value during the year, and it is hoped that some of these may find a permanent place in the Course in the near future.

To accommodate the students entitled to desks in Analytical Chemistry and in Theoretical Chemistry, it became necessary to equip new laboratories during the

summer. Room 20, on the second floor of the Walker Building, has been converted into a laboratory and connected with the large analytical laboratory, already on that floor, which now accommodates more than one hundred students. This involved the extension of office accommodations, balance room, etc. An additional room in the basement of Engineering C. was also equipped as a laboratory and an exchange effected which transferred the undergraduate work in Theoretical Chemistry to the basement and a part of the research work to the quarters formerly occupied by the undergraduates on the first floor. While this change has been greatly to the advantage of the work in question, the undergraduate quarters are already well-filled and further subdivision of the classes next year will be necessary. It is worthy of note that the present equipment of this laboratory, as devised and arranged by Professors Noyes and Sherrill, affords facilities for each individual student, which are probably unsurpassed in any instructional laboratory for the demonstration of the principles of chemistry.

Alterations in the room used by Mrs. Stinson for the distribution of supplies on the fourth floor and the general supply room on the third floor have added much to their efficiency and will result in a distinct saving of time to all concerned.

The number of students of the first year class who elected the Course of Chemical Engineering last year was smaller than that of the year before but still very much in excess of former years and sufficient to tax our present accommodations. The number of students entering this Course from other colleges has increased slightly.

The number of students electing the Course of Chemistry is, of course, much reduced as a result of the increase in the other course. The students entering from other colleges bring the number up somewhat but the Department has under consideration changes which it is hoped

may serve to attract more strong students to devote themselves to the more strictly chemical course who are now inclined to turn to Chemical Engineering. The number of graduate students in chemistry remains satisfactorily large.

No Summer Course of Industrial Chemistry was held last summer. In response to a request from Harrison Brothers, Mr. George Richter, of the Course of Chemical Engineering, was recommended for summer work in their laboratories and found the experience highly profitable.

While without many striking features, the year appears to have been one of general prosperity and of willing, efficient service throughout the Department. The list of publications shows commendable activity and the public and semi-public services have been continued as usual. As stated in the last Report, the members of the Department unite in respectfully urging the earliest practicable consideration of the prevailing conditions, and consequent difficulties, as set forth in that Report, to which we again refer. We share in the general uplift which the events of the recent past have occasioned; we hope that the much-needed opportunity for expansion is near at hand.

H. P. TALBOT.

## RESEARCH LABORATORY OF PHYSICAL CHEMISTRY.

The Laboratory has lost the services of two members of the staff. Dr. K. George Falk has resigned to accept the position of research chemist in the Harriman Research Laboratory of the Roosevelt Hospital in New York, and Mr. Robert H. Lombard has accepted a research position in Columbia University.

The investigations in the laboratory have again been assisted by a grant of \$3000 made to Professor Noyes by the Carnegie Institution of Washington.

One of the researches which has been pursued for a number of years in the laboratory—the study of the effects of salts on the solubility of other salts of various ionic types—has been continued during the past year; and the abundant experimental material accumulated has been presented and discussed in a series of seven articles by Arthur A. Noyes, William C. Bray, W. D. Harkins, and Wilford J. Winninghoff. This work has led to the establishment of certain important principles in regard to the solubility-relations of univalent salts, the behavior of which had previously appeared highly anomalous. The anomalies exhibited by such salts have also been investigated by Professor Bray and Mr. Paul V. Faragher through the measurements of the electromotive force of concentration cells.

The researches on the free-energy-change attending the formation of compounds from their elements have been continued under the direction of Professor Gilbert N. Lewis by Messrs. Merle Randall, Frank F. Rupert, George H. Burrows, and Arthur Edgar. The work on the more important compounds of hydrogen, oxygen, sulphur and iodine has been completed, and the results are nearly ready for publication. Professor Lewis has also been engaged in preparing, in co-operation with Professor Wilson of the Mathematical Department, a mathematical treatise on the Principle of Relativity.

Mention should also be made of the practical completion of the technical investigation which has been carried on for the past three years by Dr. Charles A. Kraus and Mr. Roy D. Mailey with the object of developing a mercury-arc metal rectifier suitable for rectifying high-power alternating-currents. A simple machine, fully satisfactory in its mechanical and insulating features, has now been perfected. Tests made under practical working conditions have shown that it operates efficiently. This invention is almost certain to prove of great technical importance.



In connection with this investigation, methods have been developed for the joining of iron to glass. The problem of sealing platinum to quartz has likewise been successfully solved with the co-operation of Dr. Frederick G. Keyes. These joints will be of much value in sealing electrodes into vacuum apparatus of all kinds, such as mercury-arc lamps and rectifiers.

Another investigation with a technical bearing has also been undertaken in his laboratory as a thesis, at the suggestion of Professor Edward F. Miller, by three students of the Mechanical Engineering Department, working under the direction at first of Charles A. Kraus and Roy D. Mailey, and at present of Frederick G. Keyes. The purpose of this investigation is to determine accurately certain of the physical constants of ammonia, of which a knowledge is needed in developing the theory of the use of this substance in refrigerating machines. The constants in question are the specific heat-capacities of liquid and of gaseous ammonia, its heat of vaporization, its vapor-pressure up to the critical temperature, and the specific volume of its vapor at various pressures and temperatures.

Reference is here made to these technological investigations because of the desire to have it understood that the laboratory aims not only to provide for the pursuit of researches and the training of researchers in pure science, but also to make similar provision for the study of physico-chemical problems of general technical importance and for the training of men to take charge of the research work in manufacturing establishments. Three men have already gone out from this laboratory to take highly responsible positions of this character. It is only beginning to be appreciated in this country that a thorough training in physical chemistry affords an exceptional preparation for expert and creative work of the highest order in connection with the chemical industries.

A. A. NOYES.

**RESEARCH LABORATORY OF APPLIED CHEMISTRY.**

Owing to the greatly increased size of the classes in the Laboratory of Industrial Chemistry it was found necessary to curtail somewhat the activities of the Research Laboratory of Applied Chemistry, in order that sufficient laboratory space for student work might be provided. Most of the problems outlined in our report for last year have been brought to a successful finish, and the ability of the Laboratory to be of real service to the manufacturing public has again been demonstrated. Among the subjects which are now under investigation may be mentioned the following:— A new and more accurate method for determining the oxygen content of iron and steel; an alloy highly resistant to acids for making digester valves and fittings; a study of the bacterioidal properties of the higher phenolic acids; the relative life of iron and steel pipe as found in service in New England; further studies in the electrolysis of brine. As reported last year there are still a number of problems for which financial provision has been made which must be held in abeyance until further laboratory facilities can be obtained.

WILLIAM H. WALKER.

**DEPARTMENT OF ELECTRICAL ENGINEERING.**

The improved curriculum of the Course in Electrical Engineering is now fully introduced, and the third year students are profiting from the more logical arrangement of the preliminary studies contained in the first two years of the Course. The new arrangement has put Physical Laboratory instruction in the second year, where it properly belongs, in order that it may serve as one of the introductory subjects to the Elements of Electrical Engineering which begins with the first term of the third year.

No additional subjects have been added this year and no extension of the instruction in subjects already in the undergraduate curriculum has been undertaken; but the theory and practice in electric traction has been introduced as a graduate study in addition to the graduate subjects previously established. This subject is given by Professor Pender in the form of lectures and problems. It is made an advanced subject in view of the fact that the term of lectures on electric railways in the undergraduate curriculum may be pursued in the fourth year by undergraduate students who plan to enter the more advanced study of the subject.

No further additions to the subjects treated in our lecture courses for graduate students can probably be made until additions have been made to our staff, unless the number of students in the undergraduate classes cease increasing. This year the number of students in the third year and fourth year classes with which the Department is particularly concerned have again increased over the number of the preceding year. The number of students who are applicants for higher degrees was also increased.

Last June forty-nine bachelors' degrees were conferred on students graduating from Course VI, which exceeds the number graduated in 1896, heretofore the record year for the Course. One Doctor's degree and four Masters' degrees were also conferred last June. With the increasing number of undergraduate students in the Course, additional efforts are being given to directing their training effectually. For that purpose, Professor Pender is made responsible for following the work of students in the third year, and Professor Jackson for following the work of students in the fourth year. The second year students do not regularly enter any classes administered by the staff of the Department (with the exception of five special lectures delivered by Professor Jackson), but Professor Wickenden is a member of the Faculty Committee on second year

students and has the responsibility of following as closely as he can the character of the work accomplished by the second year students in the Course. Notable numbers of college graduates continue to enter the Course in its second and third years.

The Department staff now aggregates eighteen men, of whom two are professors, three are associate professors, one is assistant professor, five are instructors, one is research assistant, and six are assistants. Of these, Associate Professor Harrison W. Smith is on leave of absence for travel in the East Indian Islands, thus leaving seventeen men in the staff work. The work of research grows as the number of graduate students and well prepared undergraduate students increase, and additional research assistants in the staff would forward this important work.

On account of Professor Smith's absence, other provision had to be made for the work done by him and Mr. William S. Gorton (Johns Hopkins 1908, and for three years a graduate student of Physics and Applied Chemistry in that University) was appointed to our staff as Instructor in Electrical Engineering. Mr. Frederick G. Perry was promoted from the rank of Assistant to the rank of Instructor, and Mr. Harry F. Thomson was promoted from the rank of Assistant to the rank of Research Assistant. Messrs. Howard Agee, Chester L. Dawes, Loren N. Downs, and Fred R. Lufkin, Assistants last year, withdrew at the end of the Institute year to go into other employment, and Messrs. Edgar P. Slack, Technology '09, James P. King, University of Maine '11, Nathaniel S. Marston, Technology '11, David M. Terwilliger, State University of Iowa '11, Mr. Vernon S. Foster, University of Kansas '10, were appointed to the positions thus vacated.

The steady development of research in the Department is gratifying. Various valuable studies have been and are being carried on by the staff and advanced students. One of the results accomplished during the year has been

the discovery that the permeability of iron may be increased from thirty to fifty per cent. by annealing it in a cyclicly varying magnetic field. Confirmation has also been obtained of the conclusion that the true permeability of iron subjected to alternating magnetizations is unaffected by the frequency of the alternations, at least up to a frequency of 300,000 cycles per second. An important investigation has been put in our hands by the Edison Electric Illuminating Company of Boston, who have undertaken to support the cost of a comprehensive study of the availability and expense of electric vehicles for the purposes of commercial hauling in cities, with particular reference to the conditions in Boston. The results of this investigation are to be published for the benefit of the electric industry and the users of commercial vehicles. It is now hoped to have at least a preliminary report of value completed for publication by June, 1912. Mr. Thomson is giving his entire time to this investigation, under the direction of Professor Pender.

Mr. Charles A. Stone has provided the funds required to experimentally investigate some of the mechanical stresses occurring in long spans of copper power-transmission wire under conditions of winter weather.

Members of the staff continue to keep in close relation with the professional development of electrical engineering by serving on the committees of professional societies and electrotechnical associations.

A few additions have been made to the equipment of the laboratories by purchase, and several gifts have been made to us. The gifts notably include a Sumpner electro-dynamometer presented by Mr. Henry A. Morss, Technology '93, and the funds from Mr. Charles A. Stone, Technology '88, already referred to. With the steady increase of the spirit of research we shall soon need another mechanic in the Department shop for the purpose of making and modifying apparatus. The time available for

such work is insufficient to allow either staff or students to do much of the work of modifying apparatus, although plans are worked out by them.

DUGALD C. JACKSON.

#### DEPARTMENT OF BIOLOGY AND PUBLIC HEALTH.

On recommendation by the Faculty and in order to make the name correspond more closely with its scope, the title of this Department has been changed from "Biology" to "Biology and Public Health." Beginning about 1894, there has gradually come to be a steady demand upon the Institute for health officers, sanitary inspectors and sanitary bacteriologists in connection with State and with Municipal Boards of Health. This has resulted in the employment of a large number of the graduates and graduate students of the Biological Department in the public Health service, and the words "Public Health" have been added to "Biology" in recognition of the readiness and the ability of the institute to prepare men and women technically trained for this new and important branch of the government service. Experience has shown that the sanitary biologist and the sanitary engineer are sometimes even more successful than the medical man in such positions and that a medical training is no longer regarded as necessary is shown by the fact that some of our leading Universities are now awarding the degree of Doctor of Public Health after courses of work and study quite different from those required for the degree of Doctor of Medicine. Professor Sedgwick's title has also been made to conform to the new arrangement and the appointment as Assistant Professor of Sanitary Biology and Public Health of Mr. Selskar M. Gunn, who had served with distinction for two years as Assistant Bacteriologist to the State Board of Health of Iowa, and the next two years as Health

Officer of the City of Orange, N. J. (from which position he came directly to the Institute), has strengthened our staff in this new direction. On May 1st, Professor Gunn was granted leave of absence until October for the purpose of making for the Bureau of Economy and Efficiency of the City of Milwaukee special inquiries into the system of public milk supply of that city and soon after the scope of his investigation was broadened to cover an examination of and a report upon the work of the entire Health Department. Professor Gunn completed his studies and returned to the Institute on October 1st, and the results of his work will soon be published.

Professor Prescott's title has been changed from Associate Professor of Industrial Biology to Associate Professor of Industrial Microbiology. The demand for men trained in this line is always considerable, and a wide variety of problems in the industrial field is brought to us for solution. Professor Prescott continues to act as adviser to persons engaged in certain industries, especially in the production of clean milk, of preserved foods, and the fermentation industries, and the Department has become a recognized source of investigation and advice along these lines.

One publication of the year perhaps deserves special notice; viz., a paper by the Head of the Department and Mr. Franz Schneider, Jr., Assistant in Biology, on "The Relation of Illuminating Gas to Public Health," a subject investigated at the Institute in 1884 for the first time in any country by the late William Ripley Nichols, a graduate and long a professor in the Chemical Department, and Professor Sedgwick. It has now been thoroughly re-investigated and brought up to date by Professor Sedgwick and Mr. Schneider in a paper just published in the Journal of Infectious Diseases of which one of the editors-in-chief, is Professor Edwin O. Jordan, a graduate of the Institute and this Department in 1888. Attention is drawn by the

paper to the fact, not hitherto known, that more than 1200 persons have been poisoned in Massachusetts by illuminating gas since the distribution of water gas was legalized in 1890.

Mr. Eugene C. Howe, a Bachelor of Science from Cornell University in the Class of 1904, and of the Institute from the Department of Biology in 1908, was in June awarded the degree of Doctor of Philosophy. Mr. Howe held for two years the James Savage Fellowship, and made a satisfactory thesis under the general direction of Professor Winslow upon the subject, "Biometric Studies of Certain Non-Spore-forming Intestinal Bacilli." Dr. Howe is at present one of the Instructors in Biology and will give during the second half of the present year a course new to the Institute on Advanced Bacteriology.

WILLIAM. T. SEDGWICK.

#### **SANITARY RESEARCH LABORATORIES AND SEWAGE EXPERIMENT STATION.**

There has been no change in the location of the Laboratories or Experiment Station, the former remaining as hitherto in the Pierce Building, the latter,—thanks to the kindness of the Commissioner of Public Works,—at the sewage pumping station of the Boston Main Drainage System at the Calf Pasture in Dorchester.

The same generous and anonymous Donor who has steadily supported this work since 1902 still stands behind it and again has our grateful thanks. A seventh volume of "Contributions" has appeared during the year and material is nearly complete for the eighth. The "sewage problem" though everywhere attacked, is not yet overcome, and still remains one of the most refractory as well as one of the most important of the public health problems of the time.



Two new lines of attack have been undertaken during the year, viz., the artificial aeration of sewage and the efficiency of covered trickling filters,—in the one case, to develop methods for the partial destruction of the organic constituents of sewage, more economical than existing methods; and in the other case, the feasibility of sewage purification entirely underground and without accompanying nuisance.

In February the Mayor of New Bedford invited Professor Sedgwick as Director of the Sanitary Research Laboratory, to advise as to the necessity and practicability of a process of sewage disinfection which had been developed at this Station, and which had been suggested in connection with New Bedford's new system of intercepting and outfall sewers. After consultation with Mr. W. F. Williams, City Engineer of New Bedford, several trips of inspection were made, and following a study of Mr. Williams' sewer plans, and of local conditions, a report was submitted urging the adoption of the process, and discussing its details as applied under New Bedford conditions. This report was printed as a City Document, but final action has not as yet been taken.

In 1910, Professor Phelps was retained by the Board of Estimate and Apportionment of New York City, to act in conjunction with Colonel William M. Black, Corps of Engineers, U. S. A., in an investigation of the present conditions of pollution of the waters of New York Harbor and its tributaries, and to outline main drainage schemes and indicate suitable points of discharge for the drainage of a considerable portion of that city. The problem presented was to develop to a maximum the capacity of the adjacent waters to receive and dispose of sewage in a harmless manner. A final report was submitted in March, 1911, which has been republished as Volume VII, of our "Contributions." The problem was complex and the method of attack in many ways unique.

In the spring our advice and assistance were sought in connection with some unusual difficulties experienced by the town of Gardner, Mass., in the operation of its sewage disposal works, and after a preliminary inspection it was decided that the problem presented features of sufficient general interest to warrant careful study. Mr. Maurice R. Scharff was detailed to this investigation and spent several days at Gardner, and some weeks later at Boston, studying conditions and making tests. A remarkable state of sub-surface clogging was found and remedial measures had to be sought for and the town was advised to make an experimental study of the possibilities of trickling filters to be followed by high rate treatment upon sand.

Mr. Samuel M. Schmidt has had immediate charge of the analytical work and of the sewage experiments, during the year and has been assisted in the laboratory by Mr. Joseph E. Harrington and others.

In April a proposal was made by the H. J. Keith Co., a well known Boston corporation dealing largely in eggs in the shell and also frozen or dried for food and industrial purposes, under which the Sanitary Research Laboratories should undertake a careful investigation of the bacteriology of eggs, with a view to a better conservation of the general egg supply and any bearing this might have upon questions of public health. The problem carried with it the offer of \$5,000 to cover the expenses of the investigation, the sole condition imposed being that whatever results were obtained should be promptly and widely published.

This gift was gladly accepted and from May 1st until the present time investigations have been actively carried forward with a view to an increase of our knowledge of the bacteriology of eggs and of better methods for the conservation of the egg supply which has become already in the United States so insufficient that eggs are now imported in considerable quantities.

The superintendence of the investigations was placed

in charge of Mr. Simeon C. Keith, a graduate of the Department of Biology in 1893, who since that time has been engaged in commercial work on industrial chemistry and biology, and who early in the current year had been appointed Research Assistant Professor of Bacteriology in the Sanitary Research Laboratories and Sewage Experiment Station. With him in the investigation were associated Professor Samuel C. Prescott, Dr. Eugene C. Howe, Dr. Burdett L. Arms, Mr. L. W. Waters, Mr. Franz Schneider, Jr., and a number of Laboratory Assistants,—Mr. Schneider being assigned to special investigations in the field.

The results of these researches are now being worked up and will soon be published.

W. T. SEDGWICK,  
*Director.*

#### DEPARTMENT OF PHYSICS.

The work of the Department and the character of the instruction during the past year have continued to be substantially as in the year immediately preceding it. The changes in laboratory and class room work which were explained in the Report to the President of last year have contributed much to the efficiency of the teaching. The division into two sections of the lectures in Heat given by Professor Norton to the third year, which as stated a year since had become absolutely imperative, has been carried into effect this year. Professor Norton has repeated his morning lecture of Tuesday and Thursday in the early afternoon of the same day to a second section of the class. This arrangement has worked to the entire satisfaction both of the instructor and the class. No apparent lack of attention or weariness on the part of the students in the afternoon section, which had been thought possible, has been

manifested, and it is purposed to continue the present arrangement in the future.

The earlier beginning of the exercises in the Physical Laboratory in the middle of the first term, which went into effect last year for Courses VI, VIII and XIV, has proved very advantageous. Because of this change we have been able to introduce into the second term for these Courses instruction in Electrical Measurements coincidentally with the lectures and recitations in electricity. It is greatly to be desired that this additional instruction be introduced into all the other courses, and particularly those whose curriculum includes further work in Electrical Engineering. Students go to that Department sadly handicapped if they have acquired no practical knowledge of Electrical Measurements as a part of their training in Physics. The importance of this instruction has already been recognized by the Department of Mining Engineering which has this year allotted the necessary time for the introduction of electrical laboratory work in the second term. An excellent set of new laboratory notes covering the work of the course has been prepared by Mr. Page, who is in immediate charge of the instruction.

It is pleasant to record that at last the subject of Precision of Measurements, which the Department has long maintained to lie at the foundation not only of physical work but of all experimental work in science and engineering has been introduced into every Course at the Institute except that in Architecture, which does not include instruction in the Physical Laboratory. The Departments of Civil and Sanitary Engineering have found the necessary time for this instruction in their curriculum as a result of the transfer of Surveying to the summer school. As stated in the Report last year the increasing inadequacy of room facilities has made it imperative to give this course by lectures to two large classes instead of by recitations to small sections as formerly, although the instructing staff

is sufficient and the Department is anxious to continue the latter method. The experience of the past year has clearly shown the difficulty of teaching a somewhat abstruse and essentially "problem course" by lectures. Until more recitation rooms are available no other mode of procedure is possible, however.

Especial attention has been given during the last year to enlarging the facilities of the Electrical Laboratory. Various additional pieces of standard measuring apparatus have been added to the previously existing equipment, particularly with a view to the development of a course of instruction relating to "high frequency" currents. It is hoped that the laboratory will soon be equipped for the measurement of high frequency resistance, inductance, period wave length, and like quantities, a knowledge of which is called for in all problems of modern wireless telegraphy.

During the year several additions of apparatus have been made to the equipment of the Laboratory of Heat Measurements for measuring thermal conductivities. With the assistance of a grant from the Rumford Committee of the American Academy of Arts and Sciences Professor Norton has carried on an extensive research into the nature of heat insulating substances. Many measurements of the insulating efficiency of various materials have been made with relation both to their scientific and industrial value.

Through the kindness of a friend of the Institute two small refrigerating machines have been loaned to the laboratory for a number of months, and a careful study of the best methods of cooling air by small refrigerating devices has been made. The results reached are particularly adaptable to the determination of data regarding the proper cooling of cold storage boxes, the magazines of ships, and like purposes.

The study of the thermal conductivity of building

materials, notably the Portland cement concrete, has been carried on continuously since the publication of the preliminary report a year ago, and further details are to be published soon.

Attention was called last year to the unexpectedly large increase in the number of students electing Electrochemistry since it was made a distinct Course, XIV, in 1909. The difficulties which this increase involves in providing the necessary laboratory space and equipment will have to be faced in the coming year, 1912, when these students reach their professional work in their senior year. The Electrochemical Laboratory was originally planned with desks and equipment for twelve students. As nearly as can be estimated at present there will be at least fourteen or fifteen candidates for the degree next year, and the present registration of the second year class, nineteen, indicates a still larger number the following year.

Great difficulty in planning ahead for students in Electrochemistry arises from the fact that the Course is attracting graduate students from other colleges, and there is no means of knowing the number of such students until they register. This year three college graduates entered in the third year.

To provide facilities for carrying on the work next year a special appropriation will be necessary to equip additional desks, the only available space for which appears to be the portion of the laboratory which has been hitherto allotted to the research work of members of the instructing staff. As the majority of the electrochemists desire to elect technical theses, the problem confronting the Department in providing space for this work in the already congested condition of the Laboratory of Applied Electrochemistry is very serious.

No changes which call for special mention have been made in the instruction during the past year. The course in Electrometallurgy is now included in that of Applied

Electrochemistry given by Professor Thompson, who has recently completed a treatise covering the whole subject of Applied Electrochemistry. This is the first book of its kind published in English, and will be of immense value to the student as it places a mass of material heretofore accessible only in the proceedings of societies and technical journals, within his reach in concise form. Professor Goodwin is at present engaged on the preparation of a presentation of electrochemical principles and their applications for the use of electrical engineers.

The Department has acquired several pieces of valuable apparatus, chiefly, by purchase, but in part by gift. Of the latter class should be mentioned a powerful Ritchie induction coil from Dr. Francis H. Williams, and a Rochon prism stadia telescope from Professor Robert H. Richards of the Institute. There has been added to the Physical Library a set of the new Encyclopaedia Britannica in heavy paper.

There have been changes in the instructing staff as follows. After a successful and devoted service of over nine years Mr. Swan has resigned his position of Instructor in Physics to engage for a time at least in professional work. Messrs. Faxon and Washburn, also instructors, have resigned, the former to engage in business, the latter in order to pursue study in mathematical and experimental physics abroad. Mr. Washburn has received the appointment of Savage Fellow from the Institute and is at present a student in the University of Berlin. Mr. Ayres, Instructor in Heat Measurements, has also resigned to go into business. The positions thus vacated have been filled by the appointment to instructorships of Mr. Herbert P. Hollnagel, S. B. (M. I. T.), Ph. D. (Berlin), Mr. Franklin L. Hunt, S. B. (M. I. T.), Mr. Henry H. Marvin, B. S. (Grinnell College) and later for two years Tyndall Fellow at Columbia University, and Mr. Walter W. King, S. B. (M. I. T.). Messrs. Hollnagel, Hunt and King had previously served

as assistants in this Department. The positions as assistants left vacant by the promotion of Messrs. Hunt and King and the resignation of Mr. Foster have been filled by the appointment of Messrs. Harold S. Wilkins, Philip V. Wells and Gordon B. Wilkes; all graduates of the Institute.

CHARLES R. CROSS.

#### DEPARTMENT OF GEOLOGY.

The changes which have gone into effect in Geological Courses during the year 1910-11 have been minor ones, whereby all the fourth-year students of both the Mining and Geological Options of the Mining Course receive petrological training in the third year, and follow this with field work in the fourth year which is now uniform for all of the students. A similar change in the third-year work of students of Civil Engineering enables them to learn the mineralogical characters of rocks before going into the field.

With the aid of the Whitney fund, some progress has been made in geophysical work in Hawaii. Mr. F. A. Perret conducted this work during the summer of 1911 at the crater of Kilauea, with the co-operation of the Geophysical Laboratory of the Carnegie Institution of Washington, represented by Dr. E. S. Shepherd. A cableway was erected across the crater and the temperature of the liquid lava was measured. Mr. Perret built a small station on the brink of the crater, which was known as the Technology Station, and he there made record continuously for three months of the fluctuations of volcanic activity. His work enlisted active co-operation on the part of citizens of Honolulu, who have formed a local organization equipped with funds subscribed for five years wherewith to carry on the work.

The Department is grateful to Mr. Henry A. Morss for a similar subscription for five years, and would here record



its appreciation of the co-operation of Dr. A. L. Day, Director of the Carnegie Geophysical Laboratory in Washington, and of Professor Willis L. Moore, Chief of the Weather Bureau who kindly supplied the Hawaiian station with a set of meteorological instruments. Our thanks are especially due to Mr. Perret for his untiring devotion and energetic accomplishment of results, and to the Volcanic Research Society of Springfield which loaned his services to the Institute.

Evening conferences for the presentation of results of geological investigation by instructors and advanced students have been held at intervals throughout the academic year for some years past. These conferences are open only to men having a professional interest in geology. During the past year, papers have been presented by the professors and graduate students on their investigations in field and laboratory, including researches in the Canadian Rocky Mountains, Vancouver Island, Costa Rica, Idaho and Hawaii. At a special meeting of the Society of Arts, Mr. Perret lectured on Messina and Etna.

Professor Daly added to his teaching the lectures in Structural and Field Geology for second-year students in Mining Engineering. He also gave a special, voluntary course of twenty lectures to seven fourth-year students in Course III, on the Geology of the Igneous Rocks. During the summer he conducted a field party for the Geological Survey of Canada in a reconnaissance of south-central British Columbia, along the main line of the Canadian Pacific Railway. In that work he was assisted by Mr. N. L. Bowen, candidate for the doctor's degree. At the close of the field season, Professor Daly served on the Royal Commission appointed to investigate the safety of the town of Frank, Alberta, which was partly destroyed by a great land-slide in 1903 and said to be threatened by another slide in the near future.

During most of the year, Professor Daly was engaged on

a critical review of the relation between plutonic and volcanic geology, and, as a result, published a general paper on the "Nature of Volcanic Action." Principal data for that publication and for a second one, on "Magmatic Differentiation in Hawaii" had been secured during the 1909 season spent in Hawaii. Both detailed studies emphasize the advantage of the vulcanologist who can make investigations among the Hawaiian volcanoes for a series of years.

Three graduate students pursued investigations under the direction of the Department. Mr. John A. Allan, assistant in the Department during the last session and candidate for the doctor's degree, further advanced his study of the Ice River district and vicinity, in British Columbia; he has published a summary account of his work during the season of 1910. At the Geophysical Laboratory in Washington, Mr. N. L. Bowen completed the experimental work necessary for his thesis to be offered in partial fulfilment of the requirements for a doctor's degree; the results have since been prepared for publication. His work was concerned with feldspar melts synthetically studied in relation to petrology and mineralogy. Mr. S. J. Schofield, candidate for the same degree, continued his work on the problems of composition and structure of the Purcell mountain range in British Columbia; and has published a brief report of his discoveries in the season of 1910. In their work both Mr. Allan and Mr. Schofield were employed as chiefs of party by the Canadian Geological Survey.

The Department greatly needs the completion of several standard sets of geological serials, now represented by volumes issued in recent years. Many other standard works are not in the Institute's library, nor are they accessible to the students in other libraries of Boston. Several thousand dollars will be required to supply these more pressing deficiencies in the geological library. As in all

former years the Department has been hampered in its teaching work by the lack of an adequate appropriation for the purchase of lantern slides.

Mr. Waldemar Lindgren, who has been appointed Chief Geologist of the United States Geological Survey, continues his work in 1911-12 as Lecturer in Economic Geology, giving lectures and conferences on that subject with special reference to the metalliferous ore deposits of North America. Mr. Lindgren's wide experience and high scholarship in the field of his subject make these lectures very valuable to the students of mining and the graduate students. Mr. Lindgren, assisted by Dr. Loughlin, was engaged during the summer of 1911 in an investigation of the mineral deposits of Tintic, Utah, for the United States Geological Survey.

During the year there have been no notable additions to either the mineralogical or petrographical collections, the funds available being barely sufficient to provide for depreciation and such small additions to the working collections as were rendered absolutely necessary by reason of minor changes and improvements in the undergraduate courses of instruction. The same is also true with regard to instrumental equipment.

It will be necessary in the course of another year to add at least two new petrographical microscopes for class work, and if the Department is to continue its policy of encouraging graduate work, especially along research lines, a number of minor pieces of apparatus should also be purchased and extensive additions should be made to our petrographical collections of specimens and thin-sections from type localities. Such collections are greatly needed for purposes of study, not only by students, but for the members of the departmental staff. We can scarcely do our full duty to our graduate students, and must ourselves suffer much inconvenience, unless we can, before long, acquire such collections. A sum of at least \$300 will be needed for the

new microscopes, while an annual addition of \$500 to our present yearly appropriation would not be more than sufficient to properly equip us with the collections mentioned.

During the summer Professor Warren was engaged partly with petrographical research and partly in private professional work. During the year he has, in co-operation with Professor Palache of Cambridge, published two exhaustive papers relating to origin, structure, and minerals of the Quincy granite pegmatites. He has also published a shorter paper relating to barite deposits of Five Islands, Nova Scotia.

Professor Shimer spent the summer of 1911 in Europe, visiting type geologic localities and museums. The large collection of fossils and rocks which he made he has presented to the Geological Department. A suite of Jurassic fossils from Vancouver Island has been given to the Department by Dr. Charles H. Clapp and many European index fossils were acquired by purchase.

Professors Daly and Shimer are giving jointly a new course on the Geology of Europe.

Dr. Loughlin has continued field and laboratory studies of the geology of eastern New England, and has published a valuable paper on the structural relations of the Quincy granite. He has finished a paper on the Preston gabbro and associated rocks in eastern Connecticut, which will be published as Bulletin 492 of the United States Geological Survey. He was employed by that Survey during the summer of 1911 under the direction of Mr. Lindgren in the Tintic mining district of Utah, his work including a geological survey and mine examinations.

Mr. John A. Allan continued in 1911, field study in the Canadian Rocky mountains for the Geological Survey of Canada. About three hundred square miles were covered during the season, the work being done on foot. The area mapped will comprise part of a section which is under

survey from the Great Plains to the Pacific Ocean along the line of the Canadian Pacific Railway.

T. A. JAGGAR, JR.

**DEPARTMENT OF NAVAL ARCHITECTURE AND MARINE  
ENGINEERING.**

Since the arrangement of a course in naval construction for officers sent for instruction from the United States Navy, there have been from time to time, inquiries from certain legations in Washington concerning the entrance of foreign students into that course. For citizens of the United States arrangements have been made for instruction in naval construction in common with the aforementioned officers, but for various reasons the same privilege cannot be offered to foreigners. This year a course parallel to that for officers in the Navy has been prepared, and which is so separated from it that the new course can be offered to all students whether citizens of the United States or other countries. Such students will work in a separate drawing-room and in some cases will receive special lectures in the theory of warship design, otherwise the course will be substantially equivalent to that for officers from the Navy. So far four ensigns from the Chinese Navy have entered this course in the freshmen class, the courses extending through five years.

Answering to a depression in shipbuilding, the classes in Naval Architecture have been small in numbers; smaller than circumstances warrant since there have always been more applications sent to the Department from ship yards and from the Bureau of Construction and Repair, than men graduated from the Department; in some cases double or treble the number of men. With the improvement in shipbuilding the classes appear to be increasing in numbers though rather conservatively. At the present

time the Department lacks an assistant (authorized by the Corporation) because no competent person has been found to take the place, whether a graduate or not, of this or any other school. The report of last year mentioned the resignation of Assistant Professor Walter S. Leland in February. This year his place has been filled by the appointment of Assistant Professor Harold A. Everett, formerly instructor in Marine Engineering.

It is my duty to mention the loss of a sympathetic friend of the Department in the death of Dr. Charles G. Weld, at one time a member of the Corporation. Of his own motion Dr. Weld undertook to provide for the following objects:—

1. The maintenance of a shop for cutting ship's models, providing a skilled mechanic for this purpose.
2. The presentation of lectures from time to time by persons eminent in the profession.
3. The purchase of books and periodicals, especially those of a more popular character.
4. The prosecution of research in the propulsion of ships by aid of the navigable model "Froude."

It was the habit of Dr. Weld to maintain with the Bursar a special fund which he renewed from time to time, on which the Department could draw at discretion after consultation with himself. It was also his habit to construe the several objects of interest liberally so that desirable adjuncts could be had. His liberal maintenance of this fund has made it possible to continue the work of the "Froude" during the summer but the balance is only enough to make necessary provisions for hauling her up for the winter. Unless some other provision can be made, the work on the "Froude" (now in successful progress) must cease.

As for the other objects mentioned, the first should receive attention from the Corporation as the cessation of work by the students in cutting models to the lines which

they have designed, and the laying out of plating on such models, would be most unfortunate.

Our library is fortunately well filled and the number of books that it is essential to procure is not so large but that the departmental appropriation can be made to cover our demands. Perhaps some other way may be found for providing special lectures from time to time.

Personally I feel much more keenly the loss of a friend who took an interest at once keen and sympathetic in the work and development of the Department, making it a matter of his own personal interest. The Course is essentially a broad course touching general engineering in many points, but in a sense the profession is narrow and comparatively few have an intelligent interest in it.

A mutually advantageous arrangement between the Bureau of Construction and Repair and the Department of Naval Architecture has often been made by which officers at the Institute have undertaken investigations of certain problems at a Navy Yard or aboard ship, using these investigations as a basis for their graduation thesis. A notable instance this year was the determination of stresses in the rudder chains of the Torpedo-Boat Destroyer "Sterrett" when turning at various speeds and helm-angles, which was ordered to the Boston Navy Yard for that purpose.

In somewhat the same way arrangements were made with the Fore River Shipbuilding Company by which progressive speed trials were made by the Department on the Steamship, "Sankaty" in lieu of the usual builders' trials for the acceptance of the vessel. These trials served as the basis for the graduation thesis for a student of the Department. Also the same Company made a special request that a member of the Department with the recording devices used on the "Froude" should take part in the builders' trials of the Torpedo-Boat Destroyer "Walke."

The following gifts were received from the estate of Dr. Charles G. Weld: A sextant, an artificial horizon, a com-

pass, a planimeter, and a protractor with divided arc and vernier. The last two are valuable instruments of precision.

Under the supervision of the Head of the Department the Senior and Junior classes made an excursion in December to the following places:—The Newport News Shipbuilding and Dry Dock Company, The Marine Department of the Maryland Steel Company, The New York Shipbuilding Company, The Cramp's Shipyard, and the Model Basin at the Washington Navy Yard.

C. H. PEABODY.

#### DEPARTMENT OF DRAWING AND DESCRIPTIVE GEOMETRY.

The changes in the instructing staff during the past year are as follows:

Mr. W. Felton Brown has been advanced to the rank of Assistant Professor in Freehand Drawing. Mr. Brown was appointed an Assistant in Freehand Drawing at the Massachusetts Institute of Technology in 1894, and was promoted to Instructor in Freehand Drawing in 1895. The greater portion of his time has been devoted to instruction in drawing from the cast and human figure, in connection with the Architectural Department. Mr. Brown studied four years in Paris under the best masters; one year in the Academie "Julien" under Benjamin Constant and Doucét, and three years in the École des Beaux Arts. He was admitted to the École des Beaux Arts after taking examinations held by the French Government and studied Theory of Color and Composition under Gustave Moreaux, and Anatomy of the Human Figure under Duval.

Mr. Clarence H. Sutherland, who has for the last two years been half-time Assistant, resigned at the end of the year, having received his degree in Civil Engineering. The Drawing Department wishes to express its appre-



ciation of the highly satisfactory way in which Mr. Sutherland performed his work.

Mr. George W. Duncan was appointed half-time assistant for the present year. Mr. Duncan is taking the Course in Mechanical Engineering, and previous to entering the Institute was a student at Syracuse University, New York, where he also assisted in the teaching of Mechanical Drawing.

No radical changes have been made in the courses of instruction during the past year, but there has been frequent revision of the printed matter, problems, and tests given to the classes. Several new plates have been made for use in the speed tests, and a number of the data sheets used in the Descriptive Geometry problems have been redesigned. A set of ten new data sheets for problems on "warped surfaces" were issued this year.

There were fifty-seven students attending the special four o'clock class in Descriptive Geometry for students entering from other colleges. This class was established five years ago for the benefit of students who were admitted to advanced standing on credentials from other colleges but were deficient in this subject.

The number taking the first year Mechanical Drawing and Descriptive Geometry was three hundred and forty-three. The number taking Freehand Drawing was three hundred and sixty-six. With the normal increase in the size of the entering classes it will soon be necessary to appoint another instructor in Descriptive Geometry, and it is very desirable that next year an assistant be appointed for the full time, the selection being made with a view to his promotion to the position of instructor.

The decoration of Huntington Hall by fifth year students in Architecture, under the direction of Professor Brown, is now practically completed. There remain but two spandrels on the north wall. The three panels completed in June treated the following subjects: Fishing Industry,

by Walter Swindell Davis; Shoe Industry, by John Henry Scarff; and Textile Industry, by Felix Arnold Burton. The four spandrels completed at the same time contain figures symbolic of Agriculture, Forestry, Astronomy and Geography, and are the work of Alvin Frederick Menke. The completed frieze will contain twenty-nine panels and six spandrels, and will be the work of twenty-eight different students.

ALFRED E. BURTON.

#### DEPARTMENT OF ENGLISH.

The work of the English Department is still growing, and each year sees the introduction of new features. The recent departure in the teaching of First Year English, the introduction two years ago of logic, has attracted considerable attention and is already being imitated elsewhere. Of the various new methods of entrance examination and teaching composition which have been first tried at the Institute, and which have been to a greater or less degree taken up elsewhere, this seems to the Department by the far most important. It is not only helpful in the direct line of the work of gaining the power of writing accurate and adequate English, but it is of much value in all lines of technical work, and especially of such as call for constructive thought. It seems to the Department, moreover, to be demanded by the character of modern life and the school-training of today.

To meet the difficulties of dealing with the increasing number of foreign students, and especially of students from the far East, attending the Institute, the English Department has established a foreign section. Into it have been gathered those foreigners whose knowledge of the English language is so incomplete that they are unfitted for either regular First Year work or drill in the Special

Section. By vote of the Faculty these foreigners are allowed to treat English as an English-speaking student would treat elementary French or German; and the instruction given to them is arranged on this basis.

The architectural memoirs, which have been for several years crowded out by the pressure of work in Course IV, have been resumed. The co-operative work which is criticised by the professional instructors in the different courses for its matter and by the English Department for the manner of its expression is especially valuable from its intimate connection with practical life; and it is to be regretted that such work cannot be done with every course.

The personnel of the Department is unchanged except for the retirement of Mr. Tietje, who was borrowed for a year from the University of Illinois, and the return of Associate Professor Pearson, who was away on a year's leave of absence.

ARLO BATES.

#### DEPARTMENT OF ECONOMICS AND STATISTICS.

No important changes have made been in the class work of the Department of Economics. The options in Economics in the second term of the Third Year are taken by a considerable number of students, showing the popularity of these studies, and indicating a desire on the part of students to devote a larger amount of time to these subjects if there were opportunity. One hundred and fourteen were enrolled in Banking and Finance; thirty-eight in Railroad Problems; and thirty in Labor Problems.

Professor Dewey was elected at the last annual meeting of the American Economic Association as managing editor of *The American Economic Review*, a new journal established by that organization, and has served in that capacity during the current year.

During the past year Professor Doten has been acting as chief investigator for the Massachusetts Commission on Compensation for Industrial Accidents. In connection with this work he has had charge of gathering statistics of accidents, the writing of a report to the Legislature, and general secretarial duties connected with the hearings, conferences and meetings of the Commission. He also assisted in drafting a Compensation Act which was enacted last July and which goes into effect July 1, 1912.

DAVIS R. DEWEY.

#### DEPARTMENT OF MODERN LANGUAGES.

The work during the past year has been carried on according to the plan of reorganization adopted last year. Now, all students, except those in Courses II, IV, IX, and XIII have a foreign language requirement in the second year, completing that of the first year. Also in the third year several new options are offered in both German and French.

During the year 1901-1902 the opportunity for correspondence with students in German "Gymnasien" and "Realschulen" was first offered to our qualified students in the elective and optional courses. The plan is that our students write German letters and the German correspondents, who have been studying English, reply in English. The students correct the mistakes and return the letter with a new one. While this correspondence has been carried on in sporadic cases during the past ten years, I believe it has never been reported. However, it now seems worth while to call attention to this feature of our work, although optional, because under our new conditions a much larger number of students are qualified for such work than ever before, and a most gratifying interest has been manifested. The opportunity was offered to one

hundred and seventy-five of our students, eighty-seven of whom eagerly accepted, and will all be in active correspondence within the month.

There are this year thirty-four sections in German distributed among five instructors, averaging nineteen students to each section, and 17.2 hours of instruction to each instructor per week. There are three sections in French, one in Italian, and one in Spanish, all assigned to one instructor, giving 10 hours of instruction per week, with an average of thirteen students in each section.

One hundred and twenty-four of the students who have entered the Institute from other colleges this fall have received complete or partial credit for the German requirement of the Course at the Institute which they have joined, and similarly one hundred and eleven have satisfied the requirement in French.

Professor Vogel and Doctor Kurrelmeyer are each preparing several new scientific German books adapted especially to our courses in the second year.

Mr. Francis H. Dike has resigned his instructorship in the Department to enter mercantile life.

FRANK VOGEL.

## The Society of Arts.

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During the year 1910-1911 fifty-four new members were admitted to the Society of Arts. Six lectures have been given as follows:

- 671st meeting, December 13, 1910. "The Scientific Administration of Public Works." By Louis A. Rourke.
- 672d meeting, December 20, 1910. "The Costa Rica Earthquake of 1910." By Professors Thomas A. Jaggar, Jr., and Charles M. Spofford.
- 673d meeting, December 17, 1911. "The Eruption of Etna in 1910." By Frank A. Perret.
- 674th meeting, February 8, 1911. "Science and Human Welfare." By Professor William T. Sedgwick.
- 675th meeting, March 3, 1911. "Physical Basis of Heredity." by Professor Edmund B. Wilson.
- 676th meeting, March 24, 1911. "The 60-inch Reflector at the Mount Wilson Observatory." By Professor George W. Ritchey.

Attendance at these lectures has been very satisfactory.

*Science Conspectus*, the publication of the Society which was started last year has been well received by the general public. There have been frequent notices in newspapers and periodicals throughout the United States and it has attracted many members from outside of New England who have joined the Society in order to receive the publication.

The Executive Committee elected for the coming season consists of Richard C. Maclaurin, President of the Institute, Elihu Thomson, Theodore N. Vail, James P. Munroe, Carroll W. Doten, Frederic H. Fay, and I. W. Litchfield.

I. W. LITCHFIELD,  
*Secretary.*

# Publications.

## THE INSTITUTE.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.—President's Report. *Bulletin of the Massachusetts Institute of Technology*, Vol. XLVI., No. 2. Boston, January, 1911.

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MASSACHUSETTS  
INSTITUTE OF TECHNOLOGY

TREASURER'S REPORT



FOR THE YEAR ENDED JUNE 30, 1911



## Treasurer's Report.

*To the Corporation of*

*The Massachusetts Institute of Technology:*

By vote of the Executive Committee, dated March 17, 1911, it was decided that the fiscal year of the Institute should terminate June 30th instead of September 30th, as heretofore. The treasurer's report, therefore, this year shows in detail the transactions for nine months only, from October 1, 1910 to July 1, 1911, but for the purpose of yearly comparison the additional gross income and outgo for July, August and September, 1911, are stated in schedule "A." The details of this three months business will be properly included in next year's report.

The following gifts and legacies amounting to \$66,653.68 have been received during the nine months, and call for the sincere thanks of the Institute.

Estate Wm. Litchfield for Scholarships . . . . .	\$5000.00
Guy Lowell for Travelling Scholarship in Architecture. . . . .	500.00
Estate Thomas Gaffield . . . . .	500.00
Mrs. Wm. B. Rogers for Salaries . . . . .	500.00
Mrs. Wm. B. Rogers for Periodicals . . . . .	225.00
Charles J. Paine for Salaries . . . . .	100.00
Charles G. Weld for Naval Architecture Department . . . . .	2500.00
Mrs. W. Scott Fitz for Seismological Research Fund . . . . .	250.00
Dr. A. A. Noyes for Physico-Chemical Research Department . . . . .	3000.00
Estate Susan E. Dorr . . . . .	1500.00
Prof. F. J. Moore for Salaries . . . . .	125.00
Saturday Club for Library . . . . .	600.00
"A friend of the Institute" for Sanitary Research Work . . . . .	6000.00
Estate J. Raynor Edmonds . . . . .	10,000.00
Estate Henry L. Pierce. . . . .	100.00
Arthur A. Carey . . . . .	500.00
Charles W. Eaton for buildings for Civil Engineering Summer School Camp . . . . .	10,000.00
M. I. T. Alumni Fund . . . . .	22,753.68
Herbert E. Fales . . . . .	500.00
H. J. Keith for Egg Investigation (\$5000 in all to be furnished) . . . . .	1000.00
Edison Electric Illuminating Co. for Electric Vehicle Research (\$3000 in all to be furnished.) . . . . .	1000.00

In addition to the above, there should be recorded the generous bequests of Mrs. Emma B. Rogers and Francis B.

Greene, Esq., received after the close of the fiscal year. The details of these bequests will be included in next year's report.

The payments received from the Alumni Fund for this year amounting to \$22,753.68 have made possible certain changes and improvements in equipment that could not otherwise have been made.

The Walker Memorial Fund, with accrued interest, now amounts to \$127,998.91.

WM. B. THURBER,  
*Treasurer.*

## Schedule A.

FINANCIAL RESULT OF THE NINE MONTHS ENDED JUNE 30,  
1911.

Total outgo, per Schedule C-1 . . . . .		\$493,463.36
Total income, less gifts, per Schedule B-1 . . . . .		484,199.52
Excess of outgo over income for 9 months . . . . .		\$9,263.84
Refunds on salaries paid last year . . . . .		118.60
		<u>\$9,145.24</u>
Income, etc., added to Funds (net) . . . . .	\$2,312.01	
Students' fees charged off as uncollectable . . . . .	30.00	
Roentgen Ray Fund, expense 1909-10 omitted . . . . .	172.69	
Appropriated for President's Fund . . . . .	500.00	
Physico-Chemical Research Fund (bal. of ap- propriation) . . . . .	16.88	
Research Laboratory of Applied Chemistry Fund, receipts of earlier years . . . . .	1,000.00	
Whitney Fund income omitted last year . . . . .	200.83	4,232.41
		<u>\$13,377.65</u>
Total excess of outgo over income 9 months . . . . .		\$13,377.65
Additional income for July, August and September less gifts (To be reported in detail next year) . . . . .		58,586.71
Additional outgo for July, August and September. . . . .		<u>122,107.85</u>
Excess of outgo over income 3 months . . . . .		\$63,521.14
Excess of outgo over income 9 months . . . . .		<u>13,377.65</u>
Excess of outgo over income for 12 months. . . . .		\$76,898.79
Gifts, per Schedule B-1 . . . . .	\$37,003.68	
Received from Rogers estate (unrestricted). . . . .	35,000.00	72,003.68
		<u>\$4,895.11</u>
Gifts received in addition to the above for special purposes: Charles W. Eaton, for buildings for Civil Engineering Sum- mer School . . . . .		\$10,000.00
William Litchfield, for scholarships . . . . .		5,000.00

## Schedule B-1.

## INCOME.

## INCOME FROM STUDENTS.

Tuition fees . . . . .	\$333,052.00	
Entrance examination fees forfeited . . . . .	510.00	
Locker fees . . . . .	459.75	
Supplies, chemicals, laboratory materials, etc. . . . .	12,951.38	
Sale of lecture notes, etc. . . . .	1,836.01	
Registration fees . . . . .	85.00	\$348,894.14

## INCOME FROM INVESTMENTS OF:—

Endowments for general purposes, Sched- ule P . . . . .	\$26,065.17	
Endowments for designated purposes, Schedule Q recapitulation . . . . .	37,310.86	
Income not credited to funds . . . . .	2,028.06	
Total per Schedule H . . . . .	\$65,404.09	
Less:		
Accrued interest on purchases \$220.56		
Annuity to Samuel Dorr . . . . .	750.00	970.56
		64,433.53

RENTS FROM INVESTMENTS OF REAL ESTATE (net.) 5,132.15

## GRANTS BY NATION AND STATE.

Annual grant from State of Massachusetts	\$25,000.00	
State of Massachusetts for scholarships . . . . .	4,000.00	
Federal Aid Income from land grant Act 1862 . . . . .	5,306.68	34,306.68

## Minor Funds, Schedule R:

Sanitary Research Fund . . . . .	\$6,000.00	
Naval Architectural Fund . . . . .	2,500.00	
Physico-Chemical Research Fund . . . . .	3,000.00	
Egg Investigation Fund . . . . .	1,000.00	
Edison Research Fund . . . . .	1,000.00	
Seismological Research Fund . . . . .	250.00	
Traveling scholarship in Architecture . . . . .	500.00	14,250.00

## INCOME FROM OTHER SOURCES.

Interest . . . . .	\$2,189.81	
Interest less credits & funds . . . . .	35.26	
		\$2,154.55
Rents, Huntington Hall . . . . .	3,500.00	
Sales of electricity, fuel and water . . . . .	1,208.46	
Lunch Room (net) . . . . .	512.12	7,375.13

Carried forward . . . . . \$474,391.63

<i>Brought forward</i> . . . . .		\$474,391.63
<b>INCOME FROM OTHER SOURCES—Continued.</b>		
Sundry Funds Income, Schedule R:		
Research Laboratory of Applied Chemistry . . . . .	\$6,655.87	
Research Laboratory of Organic Chemistry . . . . .	1,250.00	
Weld Naval Architecture Fund . . . . .	96.00	
Letter Box rents . . . . .	8.25	
Jacques Fund . . . . .	22.45	
Roëntgen Ray Fund . . . . .	12.81	8,045.38
		<hr/>
REFUNDS ON SCHOLARSHIPS . . . . .		665.00
INCOME FROM SOCIETY OF ARTS. DUES . . . . .		1,097.51
		<hr/>
Total Income . . . . . (Schedule A)		<u>\$484,199.52</u>
 <b>GIFTS.</b>		
For General Purposes:		
M. I. T. Alumni, Schedule R . . . . .		\$22,753.68
Estate Thomas Gaffield . . . . .	\$500.00	
Estate J. Raynor Edmonds . . . . .	10,000.00	
Estate Henry L. Pierce . . . . .	100.00	
Estate Herbert E. Fales . . . . .	500.00	
		<hr/>
		11,100.00
For Designated Purposes:		
General Library . . . . .		825.00
Salaries . . . . .		2,325.00
		<hr/>
		<u>\$37,003.68</u>

## Schedule C-1.

## OUTGO.

SALARIES OF TEACHERS:		
Professors . . . . .	\$102,823.28	
Associate professors . . . . .	28,819.01	
Assistant professors . . . . .	39,461.78	
Instructors . . . . .	66,657.41	
Lecturers . . . . .	7,476.70	
Librarians . . . . .	1,312.47	
Assistants . . . . .	44,623.74	
		<u>\$291,174.39</u>
WAGES ACCESSORY TO TEACHING.		
Clerks . . . . .	\$1,929.47	
Stenographers . . . . .	5,588.70	
		<u>7,518.17</u>
DEPARTMENT SUPPLIES AND REPAIRS (Schedule C-2) . . . . .		46,905.44
ADMINISTRATION AND GENERAL EXPENSES.		
Salaries of officers . . . . .	\$15,999.84	
Salaries of assistants, stenographers, etc . . . . .	12,956.81	
Advertising and printing . . . . .	11,921.78	
Insurance . . . . .	982.85	
Other general Expenses . . . . .	15,703.16	
		<u>57,564.44</u>
OPERATION AND MAINTENANCE OF PLANT.		
Mechanicians' wages . . . . .	\$3,902.36	
Laborers' wages . . . . .	35,875.72	
Light, heat and power . . . . .	24,793.25	
Repairs, (Schedule C-3) . . . . .	3,834.08	
Repairs, wages . . . . .	2,142.00	
		<u>70,547.41</u>
MISCELLANEOUS EXPENSES.		
Premiums charged off.		
General Investments . . . . .	\$1,057.50	
Rogers Memorial Investments . . . . .	408.00	
		<u>1,465.50</u>
Ednah Dow Cheney Fund . . . . .		424.64
Letter Box Fund . . . . .		1.50
Physico-Chemical Research Fund . . . . .		1,999.45
President's Fund . . . . .		315.26
Research Laboratory of Applied Chemistry . . . . .		2,329.36
Röntgen Ray Experiment Fund . . . . .		103.00
Sanitary Research Fund . . . . .		969.00
Seismological Research Fund . . . . .		1,231.13
Traveling Scholarship in Architecture . . . . .		500.00
Weld Naval Architecture Fund . . . . .		1,519.04
Whitney Fund (Investigation in Hawaii) . . . . .		1,000.00
Egg Investigation Fund . . . . .		241.18
Edison Research Fund (Electrical vehicle tests) . . . . .		259.62
Edw. Austin Fund, awards . . . . .		3,640.25
Teachers' Fund, awards . . . . .		400.00
Scholarship awards . . . . .		1,835.00
Architectural Prizes . . . . .		100.00
INTEREST . . . . .		35.26
SOCIETY OF ARTS. Expenses . . . . .		1,384.32
Total Outgo. (Schedule A.) . . . . .		<u><u>\$493,463.36</u></u>



## Schedule C-2.

*Departments.*

Applied Mechanics . . . . .	\$1,320.91
Architecture . . . . .	1,454.03
Biology . . . . .	1,614.18
Chemistry . . . . .	14,261.52
Civil and Sanitary Engineering . . . . .	2,124.39
Drawing . . . . .	238.63
Economics . . . . .	392.15
Electrical Engineering . . . . .	3,701.68
English . . . . .	98.69
General Library . . . . .	2,481.49
Geology . . . . .	833.38
History . . . . .	608.01
Mathematics . . . . .	493.25
Mechanic Arts . . . . .	2,474.99
Mechanical Engineering . . . . .	3,080.80
Military Science . . . . .	1,023.91
Mining . . . . .	1,900.73
Modern Language . . . . .	161.06
Naval Architecture . . . . .	1,047.96
Physical Culture . . . . .	1,823.16
Physics . . . . .	5,770.52
	<hr/>
	\$46,905.44

## Schedule C-3.

## DETAIL OF PLANT REPAIRS.

Rogers Building . . . . .	\$496.10
Walker Building . . . . .	248.89
Lowell Building . . . . .	370.17
Engineering A. and B. . . . .	216.72
Engineering C. . . . .	116.15
Pierce Building . . . . .	230.07
Mechanical Laboratory . . . . .	97.83
Gymnasium . . . . .	17.26
Boiler Room . . . . .	495.95
Power Plant . . . . .	366.29
Sundries . . . . .	1,178.65
	<hr/>
	\$3,834.08

## Schedule D.

## TREASURER'S BALANCE SHEET,

## I.

## INVESTMENT ASSETS.

Securities, Schedule H . . . . .	\$1,997,881.00
Funds deposited in Savings Banks . . . . .	6,817.63
Total, Schedule H . . . . .	<u>\$2,004,698.63</u>
Real Estate, Schedule I . . . . .	176,917.32
Total Investments . . . . .	<u>\$2,181,615.95</u>
Cash: In bank, for investment . . . . .	2,945.23
Total Investment Assets . . . . .	<u><u>\$2,184,561.18</u></u>

## 2.

## CURRENT ASSETS.

Cash on hand and in banks, available for general purposes, Schedule E. . . . .	\$14,420.03
Notes Receivable, Schedule F-1 . . . . .	12,231.59
Accounts Receivable, Schedule F-2 . . . . .	701.14
Rents Receivable, less reserve, Schedule F-3 . . . . .	1,500.00
Total . . . . .	<u>\$28,852.76</u>
Excess of investment assets (brought down, contra) . . . . .	245,381.46
	<u><u>\$274,234.22</u></u>

## 3.

## EDUCATIONAL PLANT ASSETS.

## Lands, Buildings and Equipment. Nominal Values.

Total book value at beginning of year, Schedule J. . . . .	\$1,703,036.33
Additions during year . . . . .	0.00
Total book value at end of year, Schedule J. . . . .	<u>\$1,703,036.33</u>

## WALKER MEMORIAL. ASSETS.

Securities (page 16) . . . . .	\$126,123.30
Cash in bank (reserved for investment), Schedule E . . . . .	1,875.61
Total assets . . . . .	<u>\$127,998.91</u>

## IMPROVEMENT FUND. ASSETS.

Securities (page 16) . . . . .	\$17,484.68
Cash in bank (reserved for investment), Schedule E . . . . .	1,162.78
Total assets . . . . .	<u>\$18,647.46</u>

II

Schedule D.

JUNE 30, 1911.

1.

**ENDOWMENT AND OTHER FUNDS.**

Funds for general purposes, Schedule P . . . . .	\$763,999.75
Funds for designated purposes, Schedule Q. Recapitulation . . . . .	1,135,390.60
Minor Funds, Schedule R . . . . .	13,225.16
Funds' income balances, Schedule R . . . . .	26,564.21
	<u>                  </u>
Total Funds . . . . .	\$1,939,179.72
Excess of investment assets (carried down, contra) . . . . .	245,381.46
	<u>                  </u>
	\$2,184,561.18

2.

**CURRENT LIABILITIES.**

Notes payable, Schedule M . . . . .	\$25,000.00
Accounts payable, Schedule N . . . . .	9,754.62
Tuition fees in advance for year 1911-12 . . . . .	7,614.00
Entrance examination fees . . . . .	3,115.00
Students' deposits in advance, breakage and supplies . . . . .	981.00
Students' deposits unclaimed . . . . .	2,198.30
Locker deposits outstanding . . . . .	126.00
	<u>                  </u>
Total . . . . .	\$48,788.92
Surplus available for current expense . . . . .	225,445.30
	<u>                  </u>
	\$274,234.22

3.

**EDUCATIONAL PLANT ENDOWMENTS AND CAPITAL ACCOUNTS.**

Endowment for Electrical Engineering Building . . . . .	\$68,000.00
Other endowments, funds and capital (not analyzed into specific items) . . . . .	1,635,036.33
	<u>                  </u>
	\$1,703,036.33

**WALKER MEMORIAL FUND.**

Balance at beginning of year . . . . .	\$125,501.97
Net income for period added to fund . . . . .	2,496.94
	<u>                  </u>
	\$127,998.91

**IMPROVEMENT FUND.**

Balance at beginning of year . . . . .	\$18,057.72
Net income for period added to fund . . . . .	589.74
	<u>                  </u>
	\$18,647.46

## Schedule E.

## CASH RECEIPTS AND DISBURSEMENTS

FOR THE PERIOD.

Total Cash Receipts . . . . .	\$485,498.43
Total Cash Disbursements . . . . .	555,596.46
Excess of Disbursements . . . . .	\$70,098.03
Cash balance at beginning of year . . . . .	90,501.68
Cash Balance at end of period . . . . .	<u>\$20,403.65</u>

Viz.:—

## CASH BALANCE.

Cash on deposit at banks:		
Old Colony Trust Co., . . . . .		\$11,131.12
Viz: For Walker Memorial . . . . .	\$1,875.61	
" Improvement Fund . . . . .	1,162.78	
" Investment . . . . .	2,945.23	
" General purposes . . . . .		\$5,147.50
National Shawmut Bank,		
For general purposes . . . . .	8,643.49	8,643.49
		<u>\$19,774.61</u>
Cash at office,		
For general purposes . . . . .	629.04	629.04
Cash balance as above . . . . .	<u>\$5,983.62</u>	<u>\$14,420.03</u>
		<u>\$20,403.65</u>

## Schedule F-1.

## NOTES RECEIVABLE.

<i>Description of Notes and Security thereof, if any.</i>	<i>Amount.</i>	<i>Rate of Interest.</i>
Chapin mortgage (property in Nahant) . . . . .	\$12,000.00	5%
Architectural Record . . . . .	231.59	
Total . . . . .	<u>\$12,231.59</u>	

## Schedule F-2.

## ACCOUNTS RECEIVABLE.

For Tuition:	
1 Student . . . . .	\$50.00
Miscellaneous:	
Chemical Breakage . . . . .	651.14
	<u>701.14</u>

## Schedule F-3.

## RENTS RECEIVABLE.

Arrears of Rents at beginning of year . . . . .		\$12,500.00
Rents due during period:		
Clarendon Street (Grundmann Studios) . . . . .	\$4,125.00	
Huntington Hall . . . . .	3,500.00	
Cabot House . . . . .	750.00	
Massachusetts Avenue property . . . . .	600.00	
		<u>8,975.00</u>
Total . . . . .		\$21,475.00
Collection of Rents during period . . . . .		<u>9,975.00</u>
Arrears of Rents at end of period . . . . .		\$11,500.00
Less: Reserve for doubtful accounts . . . . .		<u>10,000.00</u>
		<u>\$1,500.00</u>

## Schedule G.

## INTEREST AND DIVIDENDS ACCRUED ON SECURITIES.

(Not computed.)

## Schedule H.

## SECURITIES : BONDS, STOCKS AND

<i>Bonds.</i>	<i>Description of Securities.</i>		<i>Balance at be- ginning of year.</i>
\$26,000.00	Am. Dock & Improvement Co. 5% . . . . .	due 1921	\$26,800.00
105,000.00	American Tel. & Tel. Co. 4% . . . . .	" 1929	104,700.00
25,000.00	Atchison, Top. & St. Fé R.R. 4% . . . . .	" 1995	25,000.00
34,000.00	Baltimore & Ohio R.R. 3 1-2% . . . . .	" 1925	30,090.00
3,000.00	Bur. & Mo. River (Neb.) R.R. non- exempt 6% . . . . .	" 1918	4,000.00
43,000.00	Chesapeake & Ohio R.R. 5% . . . . .	" 1939	48,394.00
38,000.00	Chicago, Burl. & Quincy R.R. 4% . . . . .	" 1958	38,094.00
50,000.00	Chi. Junc. & Union Stock Yards, 4% . . . . .	" 1940	49,250.00
50,000.00	Chi. Junc. & Union Stock Yards 5% . . . . .	" 1915	50,888.00
100,000.00	Chi. & W. Michigan R.R. 5% . . . . .	" 1921	101,000.00
17,000.00	Delaware & Hudson R.R. 4% Ref. . . . .	" 1943	17,320.00
3,000.00	Electrical Securities Corp. 5% . . . . .	" 1940	—
3,000.00	Illinois Central R.R. 4% . . . . .	" 1951	3,000.00
120,000.00	Illinois Steel Co. 5% non-conv. . . . .	" 1913	119,586.25
7,000.00	K. C., Clinton & Spgfld. R.R. 5% . . . . .	" 1925	6,289.21
50,000.00	K. C., Ft. Scott & Mem. R.R. 6% . . . . .	" 1928	56,069.00
8,500.00	K. C., Mem. & Birmingham R.R. 4% . . . . .	" 1934	8,287.50
37,000.00	K. C., Mem. & Birmingham R.R. 5% . . . . .	" 1934	34,225.00
18,000.00	Kentucky Central Ry. Co. 4% . . . . .	" 1987	17,910.00
3,000.00	Lake Shore & Mich. Sou'n R.R. 4% . . . . .	" 1928	3,000.00
75,000.00	Lake Shore & Mich. Sou'n R.R.deb. 4% . . . . .	" 1931	75,000.00
100,000.00	Long Island R.R. 4% . . . . .	" 1949	96,137.50
25,000.00	Mass. Electric Co. Notes 4 1-2% . . . . .	" 1913	24,468.75
50,000.00	N. E. Tel. & Tel. Co. 4% . . . . .	" 1930	50,399.00
52,000.00	N. Y. C. & H. R. R. R. (L. S.) 3 1-2% . . . . .	" 1968	46,046.65
36,000.00	N. Y. C. Equipment 5% . . . . .	" 1919	34,740.00
31,000.00	N. Y., N. H. & H. R. R. 6% . . . . .	" 1948	35,366.00
50,000.00	Nor'n Pac. Gt. Nor'n Joint R.R. 4% . . . . .	" 1921	48,500.00
50,000.00	Oregon R.R. & Navigation Co. 4% . . . . .	" 1946	51,050.00
50,000.00	Oregon Short Line 4% . . . . .	" 1929	48,500.00
2,000.00	Ozark Equipment Co. 5% . . . . .	" 1910	2,000.00
50,000.00	Rio Grande & Western R.R. 4% . . . . .	" 1939	49,180.00
25,000.00	Southern Ry., St. Louis Div. 4% . . . . .	" 1951	24,875.00
5,000.00	Terminal R.R. Asso. St. Louis, 4% . . . . .	" 1953	5,000.00
50,000.00	Union Pacific R.R. 4% . . . . .	" 1947	51,512.00
25,000.00	Wabash R.R. Equipment 4 1-2% . . . . .	" 1912	24,360.00
19,000.00	Wabash R.R. Equipment 4 1-2% . . . . .	" 1916	18,259.00
100,000.00	West End St. Ry. Co. 4% . . . . .	" 1917	101,260.00
28,000.00	U. S. Steel Corporation 5% . . . . .	" 1963	29,325.00
25,000.00	Western Electric Co., 5% . . . . .	" 1922	24,875.00
19,000.00	Seattle Electric Co., 5% . . . . .	" 1929	18,430.00
			<b>\$1,603,186.86</b>

## Schedule H.

## REAL ESTATE MORTGAGES.

<i>Purchases and charges during period.</i>	<i>Sales and credits during period.</i>	<i>Balance at end of period.</i>	<i>Interest received.</i>
—	\$60.00	\$26,740.00	\$650.00
—	—	104,700.00	2,100.00
—	—	25,000.00	1,000.00
—	—	30,090.00	892.50
—	1,000.00	3,000.00	120.00
—	144.75	48,249.25	2,150.00
—	1.50	38,092.50	760.00
—	—	49,250.00	2,000.00
—	166.50	50,721.50	1,250.00
—	75.00	100,925.00	5,000.00
—	7.50	17,312.50	680.00
\$6,965.00	—	6,965.00	175.00
—	—	3,000.00	60.00
—	—	119,586.25	6,000.00
—	—	6,289.21	350.00
—	267.75	55,801.25	3,000.00
—	—	8,287.50	170.00
—	—	34,225.00	925.00
—	—	17,910.00	360.00
—	—	3,000.00	60.00
—	—	75,000.00	3,000.00
—	—	96,137.50	2,000.00
—	—	24,468.75	562.50
—	15.75	50,383.25	1,000.00
—	—	46,046.65	910.00
—	—	34,740.00	1,800.00
—	88.50	35,277.50	930.00
—	—	48,500.00	1,000.00
—	22.50	51,027.50	2,000.00
—	—	48,500.00	2,000.00
—	2,000.00	—	50.00
—	—	49,180.00	1,000.00
—	—	24,875.00	500.00
—	—	5,000.00	100.00
—	31.50	51,480.50	1,000.00
—	—	24,360.00	990.00
—	—	18,259.00	
—	157.50	101,102.50	2,000.00
—	18.75	29,306.25	1,400.00
—	—	24,875.00	625.00
—	—	18,430.00	475.00
<u>\$6,965.00</u>	<u>\$4,057.50</u>	<u>\$1,606,094.36</u>	<u>\$51,045.00</u>

## Schedule H. (Continued.)

<i>Stocks. Description of Securities.</i>		<i>Balance at be- ginning of year.</i>
172 Boston & Albany R.R. . . . .	par 100	\$34,456.50
10 Boston Ground Rent Trust . . . . .	" 100	900.00
64 Boston Real Estate Trust . . . . .	" 1000	68,605.64
80 Chi., Mil. & St. Paul R.R. Pfd. . . . .	" 100	5,738.00
2 Dwight Mfg. Co. . . . .	" 500	1,600.00
27 Essex Company . . . . .	" 100	3,780.00
31 Great Falls Mfg. Co. . . . .	" 100	3,472.00
56 Hamilton Woolen Co. . . . .	" 100	5,390.00
17 Pepperell Mfg. Co. . . . .	" 100	2,789.50
		<u>\$126,731.64</u>
INVESTMENTS W. B. ROGERS MEMORIAL FUND.		
\$25,000.00 Atchison, Top. & St. Fé R.R. 4% . . . . .	due 1995	\$24,470.00
6,000.00 Baltimore & Ohio R.R. 3 1-2% . . . . .	" 1925	5,310.00
7,000.00 Chesapeake & Ohio R.R. 5% . . . . .	" 1939	7,878.00
1,000.00 C., Bur. & Quincy R.R. 4% Gen. Mor. . . . .	" 1958	1,000.00
40,000.00 Chi. Junc. & Union Stock Yds. 5% . . . . .	" 1915	41,034.00
4,000.00 Cin., Ind., St. Louis & Chi. R.R. 6% . . . . .	" 1920	4,000.00
37,500.00 Detroit, Gr. Rapids & Western R.R. 4% . . . . .	" 1946	37,500.00
35,000.00 Fort St. Union Depot 4 1-2% . . . . .	" 1941	34,825.00
27,000.00 Kansas City Belt R.R. 6% . . . . .	" 1916	27,625.00
4,000.00 Kan. Cy., Ft. Scott & Gulf R.R. 5% . . . . .	" 1911	4,000.00
31,000.00 N. Y. C. & H. R. R.R. deb. 4% . . . . .	" 1934	30,225.00
1,000.00 N. Y. Central Equipment 5% . . . . .	" 1919	965.00
3,200.00 Republican Valley R.R. 6% . . . . .	" 1910	3,200.00
24,000.00 Rome, Watert'n & Ogdensb'g R.R. 5% . . . . .	" 1922	25,430.00
1,000.00 Wabash Equipment 4 1-2% . . . . .	" 1916	961.00
4,000.00 United Electric Securities 5% . . . . .	" 1940	—
		<u>\$248,423.00</u>
INVESTMENTS JOY SCHOLARSHIP FUND.		
Mass. Hospital Life Insurance Co. . . . .		\$5,000.00
Deposits in Savings Banks . . . . .		6,623.29
		<u>\$11,623.29</u>
INVESTMENTS SUSAN H. SWETT SCHOLARSHIP FUND.		
Mass. Hospital Life Insurance Co. . . . .		\$10,000.00
INVESTMENTS RICHARD LEE RUSSEL FELLOWSHIP FUND.		
\$2,000.00 Conveyancers Title Ins. Co. Mort. 4 1-2% due 1913		\$2,000.00
Grand Total . . . . .		<u>\$2,001,964.79</u>
<hr/>		
INVESTMENTS WALKER MEMORIAL FUND.		
\$30,000.00 Am. Tel. & Tel. Co. 4% . . . . .	due 1929	\$30,300.00
10,000.00 Chi., Burl. & Quincy R.R. 4% . . . . .	" 1958	10,000.00
54,000.00 N. Y. C. & H. R. R.R. (L. S.) 3 1-2% . . . . .	" 1998	47,986.35
14,000.00 Oregon Short Line R.R. 5% . . . . .	" 1946	16,310.00
5,000.00 St. Louis, Iron Mt. 4% . . . . .	" 1933	4,812.50
7,000.00 Wabash R.R. Equipment 4 1-2% . . . . .	" 1916	6,764.45
10,000.00 Electrical Securities Corporation 5% . . . . .	" 1940	0.00
Total . . . . .		<u>\$116,173.30</u>
<hr/>		
INVESTMENTS IMPROVEMENT FUND.		
\$9,000.00 U. S. Steel Corporation 5% . . . . .	due 1963	\$9,524.68
8,000.00 Electrical Securities Corporation 5% . . . . .	" 1940	0.00
Total . . . . .		<u>\$9,524.68</u>



## Schedule H. (Continued.)

<i>Purchases and charges during period.</i>	<i>Sales and credits during period.</i>	<i>Balance at end of period.</i>	<i>Interest received.</i>
—	—	\$34,456.50	\$1,161.00
—	—	900.00	47.50
—	—	68,605.64	2,160.00
—	—	5,738.00	280.00
—	—	1,600.00	60.00
—	—	3,780.00	432.00
—	—	3,472.00	372.00
—	—	5,390.00	168.00
—	—	2,789.50	102.00
		<u>\$126,731.64</u>	<u>\$4,782.50</u>
—	—	\$24,470.00	\$1,000.00
—	—	5,310.00	157.50
—	\$23.25	7,854.75	350.00
—	—	1,000.00	20.00
—	193.50	40,840.50	1,000.00
—	—	4,000.00	240.00
—	—	37,500.00	1,500.00
—	—	34,825.00	787.50
—	93.75	27,531.25	810.00
—	4,000.00	—	200.00
—	—	30,225.00	1,240.00
—	—	965.00	50.000
—	—	3,200.00	96.00
—	97.50	25,332.50	1,200.00
—	—	961.00	22.50
\$4,040.00	—	4,040.00	—
<u>\$4,040.00</u>	<u>\$4,408.00</u>	<u>\$248,055.00</u>	<u>\$8,673.50</u>
—	—	\$5,000.00	\$400.59
\$194.34	—	6,817.63	*194.34
<u>\$194.34</u>		<u>\$11,817.63</u>	<u>\$594.93</u>
—	—	\$10,000.00	\$412.50
—	—	\$2,000.00	\$90.00
<u>\$11,190.34</u>	<u>\$8,465.50</u>	<u>\$2,004,698.63</u>	<u>\$65,598.43</u>
* Not available as income			194.34
Total per Schedule B-I			<u>\$65,404.09</u>
—	—	\$30,300.00	\$600.00
—	—	10,000.00	200.00
—	—	47,986.35	945.00
—	—	16,310.00	350.00
—	—	4,812.50	200.00
—	—	6,764.45	157.50
\$9,950.00	—	9,950.00	250.00
<u>\$9,950.00</u>		<u>\$126,123.30</u>	<u>\$2,702.50</u>
—	—	\$9,524.68	\$450.00
\$7,960.00	—	7,960.00	200.00

## Schedule I.

## INVESTMENTS IN REAL ESTATE OTHER THAN EDUCATIONAL PLANT.

<i>Description of Properties.</i>	<i>Balance at beginning of year. Cost.</i>	<i>Balance at end of year. Cost.</i>
Clarendon St. Land and Buildings, Grundmann Studios	\$142,762.94	\$142,762.94
930-934 Mass. Ave., Cambridge, Land and Buildings	16,154.38	\$16,154.38
26 Edge Hill Road (Cabot House) Land and Buildings	18,000.00	18,000.00
	<u>\$176,917.32</u>	<u>\$176,917.32</u>

## Schedule J.

## LANDS, BUILDINGS AND EQUIPMENT.

## EDUCATIONAL PLANT.\*

*Land and Buildings, Book Values.*

Rogers Building	\$200,000.00
Walker Building	150,000.00
Engineering Building A, Trinity Place	90,000.00
Engineering Building B, " "	57,857.10
Engineering Building C, " "	47,561.08
Henry L. Pierce Building, " "	154,297.05
Boiler and Power House, " "	26,916.74
Technology Union, " "	19,460.36
Lot Number 1, " "	76,315.69
Lot Number 2, " "	137,241.60
Lot Number 3, " "	282,286.35
Electrical Eng. Building, Clarendon St.	121,790.93
Mechanic Arts Building, Garrison St.	30,000.00
Land on Garrison St.	50,840.00
Gymnasium Building	12,624.07
Athletic Field, Brookline	112,964.32
	<u>\$1,570,155.29</u>

*Equipment, Book Values.*

In Engineering Building	\$20,645.24
In Electrical Engineering Building	91,607.24
In Mechanical Engineering Building	20,628.56
	<u>\$132,881.04</u>

Total Educational Plant, Book Values, . . . . . \$1,703,036.33

\* The values of land, buildings and equipment under this head are nominal values which have been carried on the books at these figures for many years. A complete appraisal of these properties should be made and amounts closely in accord with the actual costs, or with the appraised values, should then be entered in the books.

## Schedule K.

## ADDITIONS TO LANDS, BUILDINGS AND EQUIPMENTS.

Additions to Lands . . . . .	\$0.00
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## Schedule L.

## DEPRECIATION ON LANDS, BUILDINGS AND EQUIPMENT.\*

Depreciation written off to beginning of year, viz.:	
On Buildings . . . . .	\$
On Equipment . . . . .	_____
	\$
Appreciation of lands (if any) . . . . .	_____
Total (net) at beginning of year . . . . .	\$
Depreciation written off during year, viz.:	
On Buildings . . . . .	\$
On Equipment . . . . .	_____
Total . . . . .	\$
Appreciation of Lands . . . . .	_____
Net Depreciation written off . . . . .	_____
Depreciation written off to end of year . . . . .	\$
	=====

## Schedule M.

## NOTES PAYABLE.

Notes Payable:	<i>Amount.</i>
Temporary loans issued . . . . .	\$25,000.00
Temporary loans paid . . . . .	0.00
	_____
Total Notes Payable outstanding . . . . .	\$25,000.00
Interest accrued . . . . .	0.00
Total Notes Payable and Interest accrued thereon	\$25,000.00
	=====

\*No provisions for depreciating properties have yet been established.

**Schedule N.**  
**ACCOUNTS PAYABLE.**

Total per balance sheet . . . . . \$9,754.62

Schedule O is omitted. This schedule provides for mortgage liabilities, of which the Institute has none.

**Schedule P.**  
**ENDOWMENT FUNDS FOR GENERAL PURPOSES.**  
**Increases and Decreases of Funds for General Purposes.**

<i>Invested Funds.</i>	<i>Funds Sept. 30, 1910.</i>	<i>Income and other increases of funds.</i>	<i>Expenditure and other decreases of funds.</i>	<i>Funds June 30, 1911.</i>
George Robert Armstrong . . . . .	\$5,000.00	\$170.00	\$170.00	\$5,000.00
Sidney Bartlett . . . . .	10,000.00	340.00	340.00	10,000.00
Stanton Blake . . . . .	5,000.00	170.00	170.00	5,000.00
Charles Choate . . . . .	32,149.54	1,093.08	1,093.08	32,149.54
George B. Dorr . . . . .	49,573.47	1,685.50	1,685.50	49,573.47
Martha Ann Edwards . . . . .	30,000.00	1,020.00	1,020.00	30,000.00
James Fund . . . . .	163,654.21	5,564.24	5,564.24	163,654.21
Katharine B. Lowell . . . . .	5,000.00	170.00	170.00	5,000.00
Arthur T. Lyman . . . . .	5,000.00	170.00	170.00	5,000.00
James McGregor . . . . .	2,500.00	85.00	85.00	2,500.00
Nathaniel C. Nash . . . . .	10,000.00	340.00	340.00	10,000.00
Richard Perkins . . . . .	50,000.00	1,700.00	1,700.00	50,000.00
John W. and Belinda L. Randall	83,452.36	2,837.38	2,837.38	83,452.36
Robert E. Rogers . . . . .	7,680.77	261.15	261.15	7,680.77
William B. Rogers . . . . .	250,225.00	8,596.83	8,596.83	250,225.00
Samuel E. Sawyer . . . . .	4,764.40	161.99	161.99	4,764.40
Nathaniel Thayer . . . . .	25,000.00	850.00	850.00	25,000.00
Albion K. P. Welch . . . . .	5,000.00	170.00	170.00	5,000.00
Charles G. Weld . . . . .	15,000.00	510.00	510.00	15,000.00
Alexander S. Wheeler . . . . .	5,000.00	170.00	170.00	5,000.00
Totals . . . . .	<u>\$763,999.75</u>	<u>\$26,065.17</u>	<u>\$26,065.17</u>	<u>\$763,999.75</u>
Less transfers . . . . .			26,065.17	
			0.00	

## Schedule Q.

## ENDOWMENT FUNDS FOR DESIGNATED PURPOSES.

## Increases and Decreases of Funds for Designated Purposes.

<i>Invested Funds.</i>	<i>Funds Sept. 30, 1910.</i>	<i>Income and other increases of funds.</i>	<i>Expenditure and other decreases of funds.</i>	<i>Funds June 30, 1911.</i>
<b>FUNDS FOR SALARIES.</b>				
Sarah H. Forbes				
For General Salaries . . . . .	\$500.00	\$17.00	\$17.00	\$500.00
George A. Gardner				
For General Salaries . . . . .	20,000.00	680.00	680.00	20,000.00
James Hayward				
Professorship of Engineering	18,800.00	639.20	639.20	18,800.00
William P. Mason				
Professorship of Geology . . . . .	18,800.00	639.20	639.20	18,800.00
Henry B. Rogers				
For General Salaries . . . . .	25,000.00	850.00	850.00	25,000.00
Nathaniel Thayer				
Professorship of Physics . . . . .	25,000.00	850.00	850.00	25,000.00
	<u>\$108,100.00</u>	<u>\$3,675.40</u>	<u>\$3,675.40</u>	<u>\$108,100.00</u>
Less transfers . . . . .			3,675.40	
			<u>0.00</u>	
<b>FUNDS FOR SCHOLARSHIPS.</b>				
Elisha Atkins . . . . .	\$5,059.00	\$170.00	\$0.00	\$5,229.00
Billings Student Fund . . . . .	50,590.00	1,700.00	*2,000.00	50,290.00
Lucius Clapp . . . . .	5,970.83	170.00	*500.00	5,640.83
Dalton Graduate Chemical . . . . .	5,128.37	170.00	0.00	5,298.37
Isaac W. Danforth . . . . .	5,725.26	170.00	*600.00	5,295.26
Ann White Dickinson . . . . .	41,368.21	1,380.21	*1,600.00	41,148.42
Farnsworth Scholarship . . . . .	5,059.00	170.00	0.00	5,229.00
Charles Lewis Flint . . . . .	5,406.51	170.00	*300.00	5,276.51
T. Sterry Hunt . . . . .	3,282.40	102.00	*125.00	3,259.40
William F. Huntington . . . . .	5,344.10	170.00	*300.00	5,214.10
Joy Scholarship . . . . .	11,623.29	400.59	*206.25	11,817.63
Income Joy Scholarship . . . . .	425.00	206.25	0.00	631.25
Elisha T. Loring . . . . .	5,509.79	170.00	*400.00	5,279.79
James H. Mirrlees . . . . .	2,944.90	85.00	*100.00	2,929.90
Nichols Scholarship . . . . .	5,059.00	170.00	0.00	5,229.00
Charles C. Nichols . . . . .	5,500.29	170.00	*400.00	5,270.29
John Felt Osgood . . . . .	5,350.00	170.00	*100.00	5,420.00
Richard Perkins . . . . .	54,023.43	*2,060.00	*2,025.00	54,058.43
Willard B. Perkins . . . . .	7,201.43	204.00	0.00	7,405.43
William Barton Rogers . . . . .	10,799.32	290.00	*11,089.32	0.00
Richard Lee Russel . . . . .	2,523.57	68.00	500.00	2,091.57
Henry Saltonstall . . . . .	10,118.00	340.00	0.00	10,458.00
James Savage . . . . .	14,535.61	340.00	600.00	14,275.61
Thomas Sherwin . . . . .	5,109.00	170.00	0.00	5,279.00
Susan H. Swett . . . . .	10,632.95	412.50	400.00	10,645.45
Susan Upham . . . . .	1,304.48	34.00	*150.00	1,188.48
Ann White Vose . . . . .	61,721.37	2,050.65	*1,200.00	62,572.02
Newsboys Fund . . . . .	100.00	0.00	0.00	100.00
William Litchfield . . . . .	0.00	*5,170.00	0.00	5,170.00
	<u>\$347,415.11</u>	<u>\$16,883.20</u>	<u>\$22,595.57</u>	<u>\$341,702.74</u>
*Less Gifts, Transfers, etc. . . . .		*5,796.25	*21,095.57	
		<u>\$11,086.95</u>	<u>\$1,500.00</u>	

## Schedule Q. (Continued.)

## FUNDS FOR LIBRARIES AND READING ROOM.

Charles Lewis Flint Library . . . . .	\$5,000.00	\$170.00	*\$170.00	\$5,000.00
William Hall Kerr Library . . . . .	2,000.00	68.00	*68.00	2,000.00
Arthur Rotch Architectural Library . . . . .	5,000.00	170.00	*170.00	5,000.00
Ednah Dow Cheney for Margaret Cheney Reading Room	14,408.28	476.00	720.64	14,163.64
	<u>\$26,408.28</u>	<u>\$884.00</u>	<u>\$1,128.64</u>	<u>\$26,163.64</u>
*Transfers, etc . . . . .			408.00	
			<u>\$720.64</u>	

## FUNDS FOR PRIZES.

Arthur Rotch Prize Fund in Architecture . . . . .	\$5,059.00	\$170.00	0.00	\$5,229.00
Arthur Rotch "Special" Prize Fund in Architecture . . . . .	5,359.00	170.00	100.00	5,429.00
	<u>\$10,418.00</u>	<u>\$340.00</u>	<u>\$100.00</u>	<u>\$10,658.00</u>

## OTHER FUNDS.

Edward Austin Fund . . . . .	\$360,000.00	\$12,240.00	*\$12,240.00	\$360,000.00
Edward Austin (income reserve)	16,184.80	*1,224.00	0.00	17,408.80
Bursars Fund . . . . .	6,341.41	*565.68	335.00	6,572.09
Susan E. Dorr . . . . .	21,288.48	*2,223.81	*723.81	22,788.48
Students' Loan Fund . . . . .	0.00	100.00	0.00	100.00
Charlotte B. Richardson (Industrial Chemistry) . . . . .	37,378.78	1,270.88	*1,270.88	37,378.78
Arthur Rotch Architectural Fund . . . . .	25,000.00	850.00	*850.00	25,000.00
Saltonstall Fund . . . . .	44,092.46	1,499.14	*1,124.36	44,467.24
Teachers' Fund . . . . .	100,000.00	3,400.00	*3,400.00	100,000.00
Whitney Fund . . . . .	25,000.00	1,050.83	1,000.00	25,050.83
Eaton Fund . . . . .	0.00	*10,000.00	0.00	10,000.00
	<u>\$635,285.93</u>	<u>\$34,424.34</u>	<u>\$20,944.05</u>	<u>\$648,766.22</u>
*Less Gifts, Transfers, etc. . . . .		*13,099.83	*19,609.05	
		<u>\$21,324.51</u>	<u>\$1,335.00</u>	

## Recapitulation of Funds.

	<i>At beginning.</i>	<i>Investment Income.</i>	<i>Expense. Origo.</i>	<i>At end, including transfers, etc.</i>
<b>SPECIAL FUNDS.</b>				
Funds for Salaries . . . . .	\$108,100.00	\$3,675.40	\$0.00	\$108,100.00
Funds for Scholarships . . . . .	347,415.11	11,086.95	1,500.00	341,702.74
Funds for Libraries and Reading Room . . . . .	26,408.28	884.00	720.64	26,163.64
Funds for Prizes . . . . .	10,418.00	340.00	100.00	10,658.00
Other funds . . . . .	635,285.93	21,324.51	1,335.00	648,766.22
Total Special Funds . . . . .	<u>\$1,127,627.32</u>	<u>\$37,310.86</u>	<u>\$3,655.64</u>	<u>\$1,135,390.60</u>
<b>GENERAL FUND.</b>				
Funds for General Purposes . . . . .	\$763,999.75	\$26,065.17	\$0.00	\$763,999.75
TOTAL INCOME per Schedule B-I Gifts, transfers, refunds, etc. . . . .		63,376.03	3,655.64	
		18,896.08	70,853.19	
<b>GRAND TOTALS . . . . .</b>	<u><b>\$1,891,627.07</b></u>	<u><b>\$82,272.11</b></u>	<u><b>\$74,508.83</b></u>	<u><b>\$1,899,390.35</b></u>

## Schedule R.

## INCREASES AND DECREASES OF MINOR FUNDS.

MINOR FUNDS.	Funds Sept. 30, 1910.	Income and other increases of funds.	Expenditure and other decreases of funds.	Funds June 30, 1911.
Research Laboratory of Applied Chemistry	\$1,031.96	*\$8,855.87	\$8,619.77	\$1,268.06
Samuel Cabot Medal Fund . . .	37.90	0.00	0.00	37.90
Dormitory Fund . . . . .	1,868.96	0.00	0.00	1,868.96
Egg Investigation Fund . . . .	0.00	1,000.00	839.18	160.82
Edison Research Fund . . . . .	0.00	1,000.00	342.95	657.05
Jacques Fund . . . . .	1,496.71	22.45	0.00	1,519.16
Letter Box Fund . . . . .	23.75	8.25	1.50	30.50
M. I. T. Alumni Fund . . . . .	0.00	22,753.68	22,753.68	0.00
President's Fund . . . . .	1,267.84	*500.00	315.26	1,452.58
Research Laboratory of Organic Chemistry . . . . .	300.00	1,250.00	0.00	1,550.00
Roëntgen Ray Experiment Fund	864.44	*185.50	103.00	946.94
Sanitary Research Fund . . . .	142.44	6,000.00	4,359.31	1,783.13
Seismological Research Fund . .	1,079.31	250.00	1,231.13	98.18
Traveling Scholarship in Archi- tecture . . . . .	0.00	*1,000.00	500.00	500.00
Weld Naval Architectural Fund	258.04	2,596.00	1,519.04	1,335.00
	<u>\$8,371.35</u>			
Physico-Chemical Research Fund	225.67	*3,414.83	3,172.28	16.88
	<u>\$8,145.68</u>	<u>\$48,836.58</u>	<u>\$43,757.10</u>	<u>\$13,225.16</u>
* Less Gifts, Transfers, etc.		3,787.52		
		<u>\$45,049.06</u>		
<b>FUNDS' INCOME.</b>				
Cash Accumulations.				
Edward Austin Fund Income . . .	\$7,728.42	*\$12,240.00	*\$15,364.25	\$4,604.17
Teachers' Fund Income . . . . .	19,552.51	*3,400.00	992.47	21,960.04
	<u>\$27,280.93</u>	<u>\$15,640.00</u>	<u>\$16,356.72</u>	<u>\$26,564.21</u>
*Less Gifts, Transfers, etc. . . .		15,640.00	*11,724.00	
		0.00	\$4,632.72	

## Schedule S.

## SURPLUS ACCOUNTS.

## CURRENT SURPLUS.

Balance October 1, 1910 . . . . .	\$201,819.27
Net increase for 9 mos. (Schedule A) . . . . .	23,626.03
	<u>\$225,445.30</u>

## EDUCATIONAL PLANT ENDOWMENTS, ETC.

Balance June 30, 1911 . . . . .	\$1,703,036.33
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## REPORT OF AUDITING COMMITTEE.

BOSTON, November 13, 1911.

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

Your auditing committee report that Messrs. Harvey S. Chase and Co., certified public accountants, employed by this committee, have examined the accounts of the Treasurer of the Massachusetts Institute of Technology for the nine months ended June 30, 1911, and have verified the cash at office and in banks, and their certificate is hereto annexed. We have verified the list of securities held by the Institute:

CHARLES C. JACKSON	} <i>Auditing Committee.</i>
WILLIAM L. PUTNAM	
JAMES P. TOLMAN	

*To the Auditing Committee**of the Massachusetts Institute of Technology:*

WE HEREBY CERTIFY that we have examined the books and have audited the accounts of the Treasurer and of the Bursar of the Massachusetts Institute of Technology for the nine months ended June 30, 1911, which is the date of the closing of the new fiscal period. We have established the assets and liabilities of the Institute as set forth on the balance sheet in the printed report of the Treasurer and, in connection with your Committee, we have checked the list of securities reported on hand by the Old Colony Trust Company against the items of the report. We have verified the vouchers for disbursements and have satisfied ourselves that all receipts of money have been acknowledged on the books and deposited in the bank and that the cash balances of the books on June 30, 1911, were actually available and that these balances were correct. We have verified the details of the bookkeeping during the year and have checked the summary of the additional income and outgo during the months of July, August and September, as shown in Schedule A of the Treasurer's report.

The report this year has been prepared by the Technology office force and has been checked and approved by us.

Very respectfully,

HARVEY S. CHASE &amp; COMPANY.