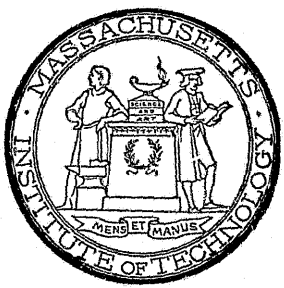
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

ANNUAL REPORT

OF THE

PRESIDENT AND TREASURER

DECEMBER 11, 1901



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PRESIDENT'S REPORT.

To the Members of the Corporation:

In the report which follows I have endeavored to call to your attention the more interesting events in the progress of the Institute during the past year. This account, though a brief one, will make evident the fact that real progress is making. Not only has the attention of administrative officers and of the Faculty of the Institute been given to the task of promoting additional means of instruction, but the methods of instruction and the subjects taught are being inquired into as well. It is a useful experience for an institution of learning, as it is for an individual, to pause now and then, in order to examine its own work and to ascertain whether or not the best results attainable are being reached. Some such general inquiry is being made at this time by the Faculty and instructing staff; and while out of this discussion, perhaps, no sudden change is likely to come, it is possible that a better perspective of the work itself and of the relations of instructors and students to that work may result.

In this examination it has not been forgotten that the Institute aims to educate its students as well as to train them, and that, to be a successful engineer in the best sense, a man needs to be educated as well as trained. President Rogers had clearly in mind this dual purpose of the Institute,— education and training. In the earlier catalogues he stated its aims in the following words: —

"The course is so selected and arranged as to offer a liberal and practical education in preparation for active pursuits, as well as a thorough training for the professions

of Civil and Mechanical Engineering, etc. It is intended to secure to every student, whatever his special course of study, a liberal mental development and general culture, as well as the more strictly technical education which may be his chief object."

More than thirty years have gone by since those words were written, but the ideal there set forth is that which the Institute stands for to-day; and I should be glad to have the members of the Corporation know that, notwithstanding the many demands which engineering makes upon institutions of learning, time and thought are being given so to adapt our instruction to these ever-increasing needs as not to lose sight of the Institute's duty to educate as well as to train.

Any such internal examination of the working of the Institute brings to light urgent needs, and shows opportunities for wider usefulness; but there are two plans already definitely set on foot which mean so much to the success of the work itself, and which are so absolutely necessary for the present wants of the Institute, that I ask your immediate consideration of them, and, through you, the consideration and generous help of those who are interested in the education of earnest young men, whether they be residents of this city or region or not. The Institute of Technology is not a local institution. It has served, and will continue to serve, the interests of the entire country.

The first plan to which I refer is one for enabling the Institute not only to keep its facilities for instruction abreast of the modern demands in such subjects as physics, electricity, chemistry, and the like, but to keep up its standards of instruction in the face of the increasing demands created by the large accession to its numbers. Two years ago there were less than 1,200 students in the Institute; to-day there are more than 1,400. In the present first-year class there are 439 students. The increase in numbers of the last two years would in itself constitute a good-sized technical school.

These students are drawn in large measure from those classes which are welcomed most gladly. A number are graduate students, a still larger proportion come from the West and South, while a considerable number come from abroad. Nevertheless, when one reflects that each regular student costs the Institute about $100 more than he pays, one realizes that this growth, gratifying as it is in one way, imposes upon us a constantly heavier burden, and demands constantly increasing resources. Should each former student return to the Institute the difference between his actual payment and the cost of his education, the sum would prove an ample endowment for the present.

Not only is it true that increasing numbers mean increasing cost, but we have already reached the limit of our buildings in matters of instruction. For instance, instruction in chemistry, physics, and in electrical engineering are given in the Walker Building, in addition to certain instruction in modern lauguages. At the present time there are being instructed in this building 684 men in chemistry, 848 men in physics, 89 men in electrical engineering, and a large number in modern languages. Even these numbers represent those left after a careful culling out of students who under ordinary conditions would be allowed to take these subjects and the cutting down of classes to the smallest possible numbers. In addition some relief has been afforded by the use of rooms, though ill-suited to the purpose, in an adjoining street; but at this moment every possible space is being utilized for every moment of the day.

For next year, when the present first-year class goes into the second year, and is followed by a similar class, I do not know how we shall be able to provide for them. The problem is one which is of so great importance that I cannot overstate its significance and the necessity of an immediate solution.

Foreseeing somewhat of this condition, the Executive Committee has recommended the erection on the Trinity Place ground of a building for electrical engineering, and

the equipment of that building with modern appliances for the teaching of that subject. But since the opening of the present term it is evident that even the removal of electrical engineering from the Walker Building would give scarcely momentary relief, and that, to deal with the problem effectively and to afford the provision for chemistry which is urgently demanded, it is necessary to move both physics and electrical engineering. Furthermore, additional investigation of the subject shows the great economy of keeping these departments in close contact.

To provide for the Department of Electrical Engineering alone would involve an expenditure for building and apparatus of about $275,000, while to erect a building capable of providing for both departments would cost about $350,000.

A most generous beginning has been made toward this new building by a subscription of $50,000 from the sons and daughters of our late colleague, Mr. Augustus Lowell, and an additional subscription of $10,000 from Mr. George A. Gardner, in all $60,000. I cannot but believe that, if the absolute need of the Institute were known, and if at the same time those who are interested in young men in America were aware of the opportunity afforded here for ministering to students from all parts of the United States, means would be provided without delay for meeting these immediate demands. The Institute of Technology has reason to be proud of what it has accomplished with modest financial resources. It would be an extraordinary condition of affairs if the response by the youth of the country to the instruction offered here should be so large that it should outstrip the facilities provided for that work.

Two courses seem open to us in meeting this problem. One is to cut down the number of students to the measure of our present working facilities by imposing such arbitrary conditions as may limit the number of those who can enter. The other way of meeting this problem is, while maintaining all proper standards of entrance requirements, and even

advancing these standards, to make the facilities for instruction so generous and so complete that the Institute of Technology may lead the world in the teaching of applied science, and that it may continue to draw to itself in yet larger numbers students from the whole country and the whole world.

I have found, now and again, some question as to the wisdom of opening without reserve our facilities to these students. Some ask, Why encourage students from Texas and from California, from England or from Australia, to come to the Institute of Technology? Why should Massachusetts supply the facilities for training those who may in the near future be using the skill thus gained in the service of her industrial rivals, domestic, or foreign?

Let me express the conviction that no institution of higher learning which undertakes to limit its ministry to its own section or to its own community is worthy of the highest devotion. And no man is worthy to direct such an institution who is willing to consider the problems of education from the sole standpoint of the upbuilding of the influence and power of the particular institution which he represents. College spirit and college devotion in the United States mean in too many instances devotion to the interests of a particular institution, and not devotion to the cause of education of the State, of the nation, and of the world. I believe profoundly that an institution which seeks to serve the purposes of the widest education and of the highest training best serves its own community when it serves best the citizens of the whole country and of the world. The attendance of students from abroad is the best barometer we have of our own alertness and our own fitness. And I am sure that, when the Institute of Technology ceases to serve as freely the student from abroad as the student from Massachusetts, when it ceases to attract to its lecture-rooms and to its laboratories the student from Texas and the Carolinas, from Washington and California, from England and Australia, from China and Japan, it will cease to serve efficiently the student from New England and the student from Massachusetts. After all, a

great institution of learning is like a great magnet. Its power grows in proportion as it attracts particles to it. Its power wanes when it ceases to carry its full load.

I earnestly commend to your attention the situation which I have just portrayed. I have endeavored to do my own duty in describing to you the situation as it exists; and I beg your assistance in bringing the facts which I have mentioned to the attention of those who have at heart the interests of Massachusetts, and of New England, and of the country.

The second enterprise already under way, to which I desire to call your attention, is the plan for the completion of what has been called the Walker Memorial Building. As you have already learned, $100,000 has been subscribed for this purpose by the past and present students of the Institute, of which $5,000 was the gift of the class of 1901 on its day of graduation. Never before, so far as I can ascertain, has a class of undergraduates given on their day of graduation, by united action of the entire class, $5,000 to their Alma Mater. When one considers that the alumni of the Institute are for the most part young men, their contribution of $100,000 is an unusual exhibition of loyalty. It is important, to my thinking, to meet this evidence of their devotion at least half-way, and to raise the remaining amount necessary to complete the building at the earliest possible moment.

The building as it is planned contemplates not simply a gymnasium, not simply a building for physical culture,— though it will serve both these purposes,— but it is to afford as well a place which shall be the social center of student life. No need is more urgently felt amongst the students of the Institute than that of closer contact with each other and with men from outside. The very fact that students do not live in dormitories, but in isolated houses, gives less opportunity to cultivate the social side. A graduate of the Institute is far more likely to fail by reason of lack of ability to deal with men than by lack of technical knowledge. He needs strengthening on the side of relationship

with other men rather than strengthening in a particular branch of a particular part of engineering.

Looked at from this standpoint, the Walker Memorial Building is to occupy to students a function no less important than that of any other means for instruction and training which the Institute supplies; and the need for the prompt and speedy completion of this building is felt no less keenly than that for increased facilities in technical instruction.

To make of this building one which shall accomplish the end in view, $100,000 is necessary in addition to that already subscribed by the past and present students. A member of our Corporation has made a generous start toward this by a subscription of $10,000, in addition to which other contributions have been received, bringing the total up to $25,000.

Should not every member of the Corporation take an active personal share in establishing a memorial to President Walker, who gave the best years of his life to the service of the Institute?

I beg to urge upon you, and through you upon those who are interested in young men and who believe that students are to be educated not only as engineers but as men, the need for a prompt completion of this subscription.

These two plans of the Institute, already begun, call for your careful, earnest, and, most of all, your immediate attention; and I commend them to you as enterprises which may well appeal to every citizen.

NEW MEMBERS OF THE CORPORATION.

Since my last report three members have been added to your body by the election of Mr. Elliot C. Lee, Mr. James P. Stearns, and Mr. Lucius Tuttle. They have been assigned to the following committees: Mr. Lee to the Visiting Committee on the Departments of Mechanical Engineering and Applied Mechanics and that of Chemical Engineering; Mr.

Stearns to the Visiting Committee on the Department of Civil Engineering and to the Committee on Finance; Mr. Tuttle to the Committee on the Department of Civil Engineering.

CHANGES OF FACULTY AND INSTRUCTING STAFF.

Professor Wells, who was granted leave of absence last year, has returned with improved health, and is taking his share of the work of the Department of Mathematics.

Professor Talbot has been appointed head of the Chemical Department. Professor Talbot graduated in the Department of Chemistry in 1885, and, except for two years of university study in Germany, has been continuously connected with the Institute, holding a full professorship since 1898. For a considerable period he has exercised an important share of the responsibilities of the head of a department; and the present action of the Executive Committee in giving him the formal appointment will, without involving any change of policy, conduce to more effective organization and conduct of the work of this important department and of our courses in Chemistry and Chemical Engineering.

Professor Homer, of the Department of Architecture, has accepted an appointment as Director of the Rhode Island School of Design at Providence, fortunately, however, continuing his lectures on the history of architecture to our students. Professor Homer graduated in the Department of Architecture in 1885, and has been connected with it in successive grades since 1887. In recent years he has also engaged in professional practice. Professor Homer carries with him to his new work the cordial esteem of his colleagues.

Professors Dippold, Currier, and Ripley have been advanced to professorships in their respective departments. Professor Dippold was appointed instructor in modern languages in 1886. He is a native of Frankfort on the Main, where he completed his course at the Gymnasium. After

attending lectures at Heidelberg, he came to America, and first occupied a position as tutor in German in Harvard University, 1870–73. After this he was instructor in French and Anglo-Saxon in Boston University, 1874–83, where he took the degree of Doctor of Philosophy. He was subsequently instructor in German in Wellesley College, and in 1883 at the Johns Hopkins University.

Professor Currier was appointed instructor in history in 1891. He graduated in 1887 from Harvard University, and in 1888 received the degree of Master of Arts from that institution. After further study at Harvard, chiefly in constitutional history, he spent a year at Berlin with Professors Gneist, Brummer, and others, and then a year at Paris in the École Libre des Sciences Politiques. In 1893 he assumed charge of the instruction in history, and has shown excellent capacity in the work.

Professor Ripley's appointment as associate professor was mentioned in my report of last year, with a brief statement of his previous record. I regret to have to add that Professor Ripley's connection with the Institute is to be terminated at the end of the present year by his resignation to accept a professorship in Harvard University, where he has been giving lectures during the present year. Professor Ripley's nine years of service at the Institute have been highly successful and productive. He enters a wider field of usefulness with our best wishes and high expectations.

Assistant Professors Puffer and Lawrence have been promoted to associate professorships in the Departments of Electrical Engineering and Architecture respectively. Professor Puffer graduated in Mining Engineering in 1884, and has been connected with the Departments of Physics and Electrical Engineering continuously since that time, becoming a member of the Faculty in 1893. He has had the main responsibility under Professor Cross for the conduct of the laboratory work in Electrical Engineering, and has this fall made an extended tour among European laboratories, with a view to securing the best attainable results in the

planning of the new building which has been authorized for that department.

Professor Lawrence has been successively instructor and assistant professor of architecture since his graduation in 1892. He has had the chief share in the development of our present engineering option in architecture,—a line of work of increasing interest and importance.

Among new Faculty appointments is that of Captain William Hovgaard, of the Royal Danish Navy, who becomes Professor of Naval Design, and will have charge of warship-design and of cognote courses of lectures. The work of the department has increased in scope and importance, particularly with the advent of the naval cadets this year. The special course planned for them has received the cordial approbation of the United States Department of the Navy.

The following instructors of last year were appointed assistant professors in the spring: Messrs. Derr, Wendell, and Norton, of the Department of Physics; Messrs. Whitney, Thorp, Fay, and Norris, in the Department of Chemistry; Messrs. Fuller, Johnston, and Park, in the Department of Mechanical Engineering. Of these, Messrs. Derr and Thorp graduated in 1889; Dr. Whitney, in 1890; Mr. Derr, Dr. Wendell, Mr. Fuller, Mr. Johnston, and Mr. Park, in 1892; Mr. Norton, in 1893. Messrs. Wendell, Whitney, and Thorp have during leave of absence taken the degree of Doctor of Philosophy in the University of Leipsic. Messrs. Fay and Norris have taken the same degree at Johns Hopkins University. All of these gentlemen have done important and responsible work as instructors, and their accession strengthens the Faculty. Messrs. Charles B. Breed, William S. Newell, Harrison W. Smith, Maurice de Kay Thompson, and Charles-Edward A. Winslow, assistants of last year, have been promoted to the rank of instructors.

Newly appointed instructors are: William J. Drisko, in the Department of Physics; Reginald R. Goodell, in the Department of Modern Languages; Charles E. Locke, in Mining Engineering and Metallurgy; and Henry L. Seaver, in English.

Mr. Drisko graduated from the Department of Physics in 1895, and was connected with the department, first as assistant, then as instructor, till 1899, when he resigned to become Professor of Physics in Colby College. Mr. Goodell graduated from Bowdoin College in 1893, and took the degree of Master of Arts in 1895. His time has since been given to teaching and to advanced study abroad and at Johns Hopkins University. Mr. Locke graduated in the Department of Mining Engineering in 1896, and has since that time been engaged in professional practice and in private work for Professor Richards. Mr. Seaver is a graduate of Harvard University, where he has also had successful experience in the teaching of English.

Instructors and assistants who have terminated their connection with the Institute are Messrs. W. L. Smith, N. E. Seavey, and C. H. Hapgood, of the Department of Physics and Electrical Engineering; C. H. L. N. Bernard, of the Department of Modern Languages; H. E. Andrews, in English; A. S. Merrill and F. R. Swift, in Mechanical Engineering; J. W. Brown and J. H. Walton, Jr., in Chemistry; H. C. Plummer and W. L. Stevens, in Mining Engineering; G. E. Russell and A. B. White, in Civil Engineering; and F. Cushman, Jr., in Mechanic Arts.

The following assistants have been appointed: John P. Sanborn, Jr., and Robert G. Valentine, in English; Edward P. Beckwith and Arthur C. Davis, in Chemistry; Frederick G. Clapp, in Geology; Francis B. Driscoll and Samuel L. Wonson, in Civil Engineering; Henry L. Kehl and Harry R. White, in Mechanical Engineering; John Boyle, Jr., William W. Garrett, and Frederic H. Sexton, in Mining Engineering; Warren I. Bickford, Francis E. Cady, Harry E. Dart, Clinton M. Dearden, Frederic W. Freeman, Herbert H. Kennedy, and George L. R. Mitchell, in Physics; James C. Woodsome, in Mechanical Drawing; and Charles E. Littlefield and Eugene S. Foljambe, in Mechanic Arts.

SCHOLARSHIPS.

The Executive Committee assigned for the present year $5,000 from the Austin Fund for undergraduate scholarships. The number of applicants for Institute scholarships up to the present time has been 263, while 123 submitted applications for the 40 State scholarships. 62 of these made applications in both places, leaving the total number of applicants considered by the Faculty and the State Board of Education 324. Of these, 28 have received scholarships to the amount of full tuition; 157 others have received smaller amounts, averaging somewhat more than $100 each. In accordance with the act of the Legislature authorizing division of State scholarships, 21 of the 40 were so divided, thus increasing the number of recipients to 61.

GRADUATE SCHOLARSHIPS.

The graduate scholars of the current year are Messrs. Arthur H. Birks, S.B., Robert R. Goodrich, S.B., Louis R. Henrich, S.B., William G. Holford, S.B., George T. Hyde, S.B., Ellis F. Lawrence, S.B., Julius E. Ober, S.B., Langdon Pearse, S.B., Francis W. Puckey, S.B., and Bart E. Schlesinger, S.B., all of the class of 1901; Walter R. Kattelle, S.B., of the class of 1900, William C. Phalen, S.B., of the class of 1899, Henry A. Swanton, S.B., of the class of 1894, and John H. Morse, B.A., of the University of Nebraska. Of these students, five are working in the Department of Architecture, two in Chemistry, two in Civil Engineering, one in Electrical Engineering, one in Geology, and one in Naval Architecture, while one is taking special work in Drawing and Mechanic Arts.

FELLOWSHIPS.

The Savage Fellowship has been awarded to Mr. M. de K. Thompson of the class of 1898. Mr. Thompson, previously

an assistant in the Rogers Laboratory, has been appointed instructor in electro-chemistry, and is spending the winter in study at the Polytechnicum at Zürich.

The income from the Austin Fund has enabled us to continue the following appointments. Mr. Arthur A. Blanchard, of the class of 1898, and for two years assistant in theoretical chemistry; Mr. Louis P. Chapin, a graduate of the University of Minnesota and since 1897 assistant in general chemistry; and Mr. Miles S. Sherrill, of the class of 1899, assistant in analytical chemistry, are taking courses at the University of Leipsic. Mr. Joseph G. Coffin, of the class of 1898, for two years assistant in physics, is a graduate student at Clark University. In addition two new appointments have been made this year: that of Mr. John W. Brown, assistant last year in analytical chemistry; and that of Mr. James H. Walton, assistant in general chemistry, who are studying for the degree of Doctor of Philosophy at the University of Heidelberg.

STUDENT ADVISERS AND STUDENT LIFE.

During the past year, efforts have been made in one direction or another to assist students in their choice of studies and to give them such advice as should be helpful to them in their work and in their life. The members of the first-year class have been for several years assigned to members of the instructing staff for this purpose, and instructors so designated have been termed Advisers. This plan, while it has been productive of good, has not resulted in all that was expected. At the beginning of the present year the Advisers themselves were called together, and were invited to meet the students of the incoming class at the beginning of the term. This meeting resulted in the establishment of useful relations between students and Advisers; and, with some modification, it is hoped that the plan may have still further application next year.

One of the problems which confronts the young man

coming to the Institute, and which has not always been satisfactorily solved, has been that of securing comfortable quarters. A building is now being erected on Huntington Avenue which is to serve the purpose of a dormitory, or perhaps more nearly the purpose of the English University House. It will accommodate about one hundred and seventy-five men in a most comfortable fashion, and they will be provided with meals as well as rooms in the building. While not the property of the Institute, it will be conducted with the co-operation of its officers.

TECHNOLOGY FIELD DAY.

The action of the undergraduates of the Institute concerning athletics, taken during the past year, has been of a most satisfactory character. The members of the Corporation will recall the sad circumstances attending the celebration of what was known as the "Cane Rush" in November, 1900. Since that time, in a most frank and manly way, the undergraduates have taken up the question of changing this old-time celebration into some form of athletic contest which should be satisfactory and yet furnish a test of strength between the Sophomore and Freshman Classes. Incidentally, the entire question of athletics was discussed, and considerable thought was given to the forms of exercise consistent with the work of students of the Institute. As a result of the discussion, the student body voted to withdraw for the present from inter-college football, and to confine their participation in this game to the class contest. They voted, in addition, to substitute for the former "Cane Rush" a series of athletic contests, to be held on a day chosen for that purpose, and to be known as "Technology Field Day." These contests were successfully held, last November, in the presence of a large number of friends and graduates of the Institute; and the occasion proved not only a most interesting one from the standpoint of the events themselves, but also a most satisfactory one as marking a sensible solution of such a question by students.

ENTRANCE REQUIREMENTS AND EXAMINATIONS ABROAD.

The past year has seen a wide discussion among colleges in the matter of entrance requirements. The question is one which is of great importance to the Institute; and I have to report that the Faculty have adopted a resolution by which, after 1903, the definition of entrance requirements will be so changed as to require an applicant for admission to have done preliminary work in both German and French.

Examinations for admission have been held during the past year in a number of places, particularly in the South and West, where previously we have held none. The Faculty has accepted examinations for admission conducted by the College Examination Board of the Middle States and Maryland. Entrance examinations were held also in London in June last, for the first time, for the convenience of such English applicants as might wish to take advantage of engineering educational facilities in America. The results have been satisfactory; and, while the examinations have resulted in the attendance of only a small number of students from England, they have fulfilled their main object in stimulating the discussion of questions which concern engineering instruction both here and abroad.

CLASS OF NAVAL CADETS.

An interesting addition to our student body has been brought about in the presence of the Naval Cadets of the United States now here for instruction in naval architecture. The Navy Department appoints, each year, two or three men as Naval Cadets; and, beginning with the present term, these men are to be educated in the Department of Naval Architecture of the Institute of Technology. At present three cadets are pursuing work here, to be followed from year to year by a similar number. A special course in

naval architecture has been arranged to meet the needs of these students.

GIFTS FOR THE PAST YEAR.

The following gifts, in addition to the subscriptions for the Walker Memorial Building and the new building for Electrical Engineering, which have already been announced, have been available for the present year.

The General Court of Massachusetts has by its vote continued its annual appropriation of $25,000 for ten years.

The bequest made some years ago by Mr. Henry Saltonstall, a friend we love to remember, has become available during the present year.

I have also the pleasure to acknowledge the gift of a Westinghouse air brake by the Westinghouse Company, and of a milling machine which has proved a most valuable contribution to the physics laboratory, and which was provided by the thoughtfulness of Mr. Francis Blake. In addition to these I have to acknowledge the gift of a number of specimens of ores from the Colorado Fuel and Iron Company, and the gift of the painting, "The Discovery of Aniline," by the Fallon heirs.

I desire at this time to acknowledge the gift of a number of prizes, instituted by Mr. Samuel Cabot for individual physical improvement, which have proved to be a great stimulus toward physical excellence.

A free bed, provided by the Massachusetts General Hospital for the benefit of any student at the Institute in need of such facilities, has proved one of the most welcome gifts which could come to the student body. It has already been occupied by a number of students, and is gratefully accepted as a recognition on the part of the authorities of the Hospital of the work done by the Faculty of the Institute.

SOCIETIES AND PUBLICATIONS.

The various societies connected with the Institute are accomplishing in their separate fields work of an important sort. The alumni societies in other parts of the country have in the past year taken a new interest in the Institute and its work; and many evidences of this have come to the instructing staff, not only in the Walker Memorial subscription, but in suggestions and inquiries regarding the work of the Institute. This spirit is one which it is desirable to foster in every way, and one which I hope to see increase as time goes on.

One of the agencies which has contributed in large measure has been the Technology Club, which has, during the past summer, taken a new house on Newbury Street, and which is filling a constantly increasing place in ministering to the social life of the students and alumni.

The *Quarterly* and the *Review* have continued during the past year to serve their purpose admirably, and to contribute to a knowledge of the work of the Institute.

The Institute was represented at the Yale Bicentennial Celebration by a committee of the Faculty consisting of the President and Professors Sedgwick and Porter. It was also represented at the Pan American Exposition by an exhibit designed to show the nature of the work accomplished at the Institute. At the request of the authorities of the Charleston Exposition this exhibit has been removed to that exposition without cost to the Institute, and will remain there until the close of the exposition.

ECLIPSE EXPEDITION.

An expedition made up largely of members of the instructing staff of the Institute, under the leadership of Professor Burton, was sent last May to observe the total eclipse of the sun in Sumatra. The observations and photographs which they obtained, and which are now being discussed, promise results of interest and value.

REPORTS OF DEPARTMENTS AND STATISTICS.

There is given in the following pages a summary of the reports of the heads of the various departments, together with statistical information prepared in the office of the Secretary concerning attendance, choice of studies, and similar matters. The information contained in these reports and tables is of the highest value, and I commend it to your careful inspection.

HENRY SMITH PRITCHETT,
President.

BOSTON, Dec. 11, 1901.

REPORTS FROM THE DEPARTMENTS.

Civil and Sanitary Engineering.

No changes have been made in the course of study in Civil or Sanitary Engineering during the past year, and no important changes in the staff of instruction.

The number of students in this department is increasing; and the drawing-rooms are reaching the limit of their capacity, particularly that occupied by the second-year students. The Engineering Library also is growing very rapidly, and will within a short time be so crowded that some additional room will be required. This will render necessary further changes in the arrangement of the rooms of the department; and, in making plans for any new buildings, provision should therefore be made for additional space for this department, adjoining the quarters which it now occupies.

The demand for graduates in civil engineering has steadily increased. Since May there have been received applications for over one hundred and twenty young men to fill civil engineering positions; while the class which graduated last June, although the largest ever sent out, numbered but forty. Of these applications, thirty-five were for structural work, forty-one for railroad work, twelve for teaching, twelve for hydraulic work, and twenty-three for miscellaneous engineering work. In addition to these, during the spring of 1901, previous to May 1, there were some fifty other applications.

In December, 1900, the Base Line Apparatus, which has been in use in the Summer Schools of the Civil Engineering Department for the past five years, was tested by the officers of the United States Coast and Geodetic Survey, not only at Washington, D.C., but also under the conditions of actual

practice at the Alice Base Line in southern Texas. The test was favorable to the Institute apparatus; and a report by Assistant John F. Hayford, C.E., has been published in the June number of the *Technology Quarterly*.

The party sent to Sumatra to observe the total solar eclipse of May 18, 1901, consisted of Professor A. E. Burton and Mr. George L. Hosmer of the Civil Engineering Department; Mr. Harrison W. Smith, instructor in the Department of Physics; and Mr. Gerard H. Matthes, a graduate in civil engineering of the class of 1895, at present Assistant Hydrographer of the United States Geological Survey. An appropriation of $2,000 was made from the Austin Fund for this expedition, all expenses beyond this amount being met by private contributions. Through the courtesy of the Superintendent of the United States Coast and Geodetic Survey the party was furnished with the half-second pendulum apparatus, by which determinations were made of the force of gravity at several points near the earth's equator. Professor E. C. Pickering, of the Harvard College Observatory, kindly loaned the expedition two Clarke lenses, ground especially for eclipse photography. The outfit, in addition to the above, consisted of an astronomical transit with micrometer and latitude level, three chronometers and a chronograph, an equatorially mounted telescope with five-inch objective, a magnetometer, and a dip circle. The party left New York February 24, and arrived at Padang, on the west coast of Sumatra, April 6. The Dutch government gave generous assistance to the expedition, and an excellent location for the observing station was obtained at Sawah Loento in the interior of the island. Here three buildings were constructed to shelter the different pieces of apparatus, and masonry piers were erected for the three large cameras. The day of the eclipse was not perfectly clear, but at the time of totality the conditions were such as to enable Mr. Smith to secure several fine photographs of the corona. The shadow bands were seen distinctly both before and after totality, but the photographic records

of these bands are not entirely satisfactory. Magnetic observations showed slight disturbances of the magnetic needle. Pendulum observations were made at Sumatra, at Singapore, and afterwards at Washington, D.C. The party returned by the way of China, Japan, and the Sandwich Islands. A full report of the work of the expedition will soon be published in the *Technology Quarterly*.

It is interesting to note the extent to which instructors and assistants are engaging in professional work during the summer vacations. Such work is encouraged in order that the young men may come in touch with practical men and practical methods. During the past summer seven members of the department were engaged in bridge design and in surveying of various sorts.

The fourteenth session of the Summer School of Civil Engineering was held at Machias, Me., where the school was held in 1896 and 1897. Twelve students were in attendance. The work was in charge of Professor Robbins and Mr. Sweet, assisted by Messrs. Driscoll, Pearse, and Wonson of the class of 1901. The topographical work consisted of an extension of the plane-table sheets and triangulation of four years ago. The hydraulic work consisted of both tube and meter measurements of the flow of the Machias River and of a canal supplying one of the mills.

Soundings were made at Howard Bay, some eleven miles from Machias, where a tide-gauge was set up and continuous readings were taken to determine the mean sea-level. The location of the tide-gauge was the same as that occupied by the United States Coast and Geodetic Survey several years ago, and the elevation was referred to the bench mark of that survey on an adjoining ledge.

Mechanical Engineering.

The present school year 1901–1902 is the second of the option in heating and ventilation, the first of the new course in naval architecture given to the Naval Cadets, the first

in which an option in machine design is given to Course X., and the first in which the new engineering options in Courses V. and VIII., as well as the advanced course for graduates of Courses V. and VI., go into operation. All of these involve additional work on the part of the Mechanical Engineering Department.

If the laboratory is to continue to hold the position that it has held in the past, certain additional apparatus must be obtained, both in view of the increasing number of students to be provided for and also to enable us to make investigations along certain new lines which are of great importance from an engineering point of view.

Probably the two most complete investigations made in connection with thesis work during 1900–1901 relate, the first to the flow of air through orifices and the second to the explosion of gases. The formulæ for the flow of air used at the present time are based on the experiments of Fliegner. These experiments were made with orifices under 10.0 millimetres in diameter, and with pressures not greater than 80 lbs., and constantly decreasing. The apparatus at the Institute is arranged so that orifices up to two inches in diameter, or 51.3 millimetres, can be tested under constant pressures up to 350 lbs. During the past year orifices from three-sixteenths through five-eighths of an inch have been tested. Experiments have been conducted also to determine the explosive force of mixtures of gas and air under initial compression. Very little work has been done in this line outside of the tests made at the Institute. The work is especially valuable in connection with the study of gas-engines.

Through the kindness of the officials of the various railroads, opportunity has been furnished for some years to conduct road tests of locomotives in connection with the thesis work of the students. During the present school year the series of such tests is exceptionally complete.

Mining Engineering and Metallurgy.

The importance of metallography, the microscopical study of the structure of metals, is being more and more recognized. Even the iron foundries are now using this means for controlling the quality of their materials, in order to produce even and reliable results. The course in this subject has been transferred from the Chemical to the Metallurgical Department, where it naturally belongs. Lectures and laboratory work in this line have been added to the curriculum for all regular students in the Course in Mining Engineering and Metallurgy, and advanced work is provided also for those who elect this subject for a thesis or wish to work upon it with the view to obtaining an advanced degree. This work is under the charge of Professors Hofman and Fay.

The instructing force has been increased from three assistants, as it was last year, to four assistants and an instructor. A further increase may be needed next year,

The Summer School of Metallurgy was held in New York, New Jersey, Pennsylvania, and Maryland. The party had a fine opportunity to see the smelting of zinc for the formation of oxide as well as the production of spelter at the works of the New Jersey Zinc Company. The study of the metallurgy of copper was taken up at the works of the Nichols Chemical Company, the Baltimore Copper Company, and the Guggenheim Smelting Company. Iron blast furnaces and the Bessemer process were studied with the Maryland Steel Company and the Pennsylvania Steel Company; open hearth steel manufacture, with the Pennsylvania Steel Company, the Pencoyd Iron Company, and the Midvale Steel Company; the crucible steel process, at the works of the Atha Steel Company; and lead and silver smelting, with the Guggenheim Smelting Company.

A graduate course in mining and metallurgy has this year been added for students who can afford to give an additional year to professional study. It enables the student to take

additional mechanical and electrical studies, and then leaves him, by means of two options, the choice between mining and metallurgical work.

Architecture.

The steadily increasing number of our graduates returning to the Institute for a year's study is perhaps the most gratifying thing connected with the Department of Architecture. This year there are eleven Institute graduates and one from Columbia University pursuing advanced courses, and five of them are candidates for the degree of Master of Science. The year is not only a breathing-space in which to become better acquainted with the culture which our library gives, but it is the opportunity for a fuller application of practical problems and for continued study in professional work. It is the true means of fostering work of a high grade.

The option in architectural engineering has well met an important demand, and its high standard is fully acknowledged by the exceptionally good positions found for its graduates. It is already beginning to attract students from other universities; and we have at present one advanced student in the option, a candidate for the Master's Degree.

The option in landscape architecture will complete its first four years next June. These years have fully proved that we have made no mistake in adding this option to our course. The facilities offered by the Institute, and the unusual opportunities for outdoor study in close proximity, leave nothing to be desired. Notwithstanding the entire lack of precedent of a well-defined course of study for the landscape architect, the results of the year show need of only slight changes in that laid down. These will be carefully considered and attended to.

The prosperity of the country made itself so strongly felt last summer in the demands from architects for draughtsmen's services that our Summer School was given up. The demand came for every one we could send, experienced or

otherwise; and we could not advise against so good an opportunity of early acquaintance with the routine of an architect's office.

Chemistry and Chemical Engineering.

Reference was made in the President's Report of last year to the arrangement of five series of optional studies within the chemical course. These options were offered to students of the second year at the beginning of the school year 1900–1901; and at that time three students selected Option 1, thirteen students Option 2, and two students Option 5, while of the present second-year class six have selected Option 1, seven Option 2, one Option 3, three Option 4, and one is undecided as yet between Options 2, 3, and 4. On account of the necessary delay in bringing these options to the notice of the students of the first of these classes, it is probable that the selection made by the present second-year class is more nearly typical of what may be expected in the future; but the number of students entering Option 1 will probably increase as the advantages of this option for students intending to devote themselves to technical chemistry after graduation become better known.

The optional studies of the fourth year of the Course in Chemical Engineering have been increased by the introduction of a course in machine design and a course treating of the general principles of chemistry.

Minor changes in individual courses of instruction include an improved system of note-book correction in the laboratory of inorganic chemistry, by which the work of an increased number of students is more efficiently inspected than formerly and with less delay to the student; an increase in the number of excursions in connection with the course in industrial chemistry; a modification of the laboratory work in the examination of foods to meet the demand for a knowledge of food adulterants; and the introduction of a special course in the testing of air for students in the heating and ventilation option of the Mechanical Engineering Course.

The laboratories of industrial chemistry have been enriched by two gifts,—a set of the *Zeitschrift fiir angewandte Chemie*, given by Mr. Samuel Cabot of our Corporation, and a Gates rock-crusher, presented by the Allis-Chalmers Company of Chicago, through Mr. Cabot. The *Zeitschrift* is a valuable addition to the small supplementary library of technical works which is being brought together for the immediate use of students in industrial chemistry in the Pierce Building. The rock-crusher is an equally valuable addition to the laboratory equipment.

The large increase in the entering class of this year has already crowded the laboratory of inorganic chemistry; and the number of students who will be entitled to working places in analytical chemistry next autumn, in the second, third, and fourth years, exceeds by about thirty-five or forty the number of desks which can be provided, with the present laboratory space. All can be accommodated next year if an additional laboratory can be equipped on the second floor, but a still larger number must be provided for in 1903–1904; and, if the entering class increases in size, further provision for inorganic chemistry, both lecture-room and laboratory space, will then be unconditionally necessary. Besides the increase of space demanded for the two branches of the department just mentioned, other laboratories are in need of enlargement; and it is becoming more and more essential for the well-being of the Chemical Department that members of its instructing force should have both space and time at their disposal to be devoted to research work, and that such work should be a recognized part of their duties. Several of the private laboratories which it is now possible to provide are inadequate in size; and throughout the department small laboratories for special lines of work, such as are found in all the best foreign laboratories, and the newer American laboratories, are much desired. Not less important is the development of research laboratories for advanced students upon a more liberal scale than is now possible, and the need of a room to be used as a

chemical museum, referred to last year, is still felt. In view, then, of the necessity for the development of all branches of the Chemical Department, it is evident that the entire Walker Building is not too much to devote to chemical purposes, as soon as such a change is made possible by the increase in available buildings.

During the past summer Professor Talbot spent some time in the inspection of laboratories of technical chemistry in Germany and England, and in the examination of the general methods of teaching this subject employed in those countries. During a part of the year Professor Whitney has had a most successful connection with the laboratories of the General Electric Company at Schenectady, which has already resulted in the placing of several of our graduates in positions at that place. Mr. Rolfe has spent part of the year in Porto Rico, in connection with the sugar industries of the island.

Physics and Electrical Engineering.

Increase in the number of students and growth in the various courses of the department have been particularly marked the past year; and the beginning of the present term has found our lecture-rooms and laboratories more severely crowded than ever before,— a condition which, we trust, will be remedied on the erection of a new building in which a part, if not the whole, of our work may find suitable accommodation.

Much new apparatus and machinery has been added to the several laboratories. Especially should be mentioned the addition to our mechanician's shop of a Brown & Sharpe milling machine, the generous gift of Mr. Francis Blake, of the Corporation,— a machine which is of the utmost service in the large amount of construction which is carried on in the department.

In the matter of instruction much good is resulting from a system of conferences which has been introduced into a

portion of our laboratory exercises, especially in the Laboratory of Electrical Measurements. At intervals of a few days the student is subjected to an informal examination by the instructor, and in this way a close watch can be kept upon the work; while, on the other hand, an opportunity is given for valuable personal instruction. Such frequent conferences consume a great amount of time, but in no other way is it possible so to minimize the danger always present in the laboratory of the performance of the work by the student by rule of thumb. This system will be extended in other laboratories as far as the time of the instructors will allow.

The number of students in the Laboratory of Heat Measurements has been very greatly increased by the addition of the fourth-year students in Mechanical Engineering, so that the total number to be accommodated this term is one hundred and seventy-five. The engineering students now receiving instruction in the subject for the first time take up the testing of fuels and the measurement of high temperatures, including the temperature of furnaces. The instruction given to students of the courses in Chemical Engineering and Mining Engineering has been extended to cover the use of electric fusion processes for the preparation of carbides and other applications of the electric furnace.

Somewhat over a year since, as was fully explained in the last President's Report, a new option in electro-chemistry was established in Course VIII. The value of this course seems to have been appreciated by the public, since during the present term eleven students have entered it at the beginning of the second year, and two graduates from other colleges have come to us especially for this work, a number far in excess of the expectations of the department. The instruction of these students in technical electro-chemistry will next year necessitate a special laboratory with suitable equipment for such work, for which the graduate course in mining also calls.

Mr. M. de K. Thompson, for several years an assistant

in the Rogers Laboratory, has been appointed instructor in electro-chemistry, with leave of absence to study abroad. During the past summer Dr. Goodwin and Mr. Thompson have made an extended tour of inspection of the electro-chemical laboratories of the German and Swiss technical schools.

In connection with the erection of the proposed new laboratories of electrical engineering, Professor Puffer was granted a leave of absence for the first half of the present term, and has spent that time in a careful study of the principal foreign schools of electrical engineering, besides visiting many of the leading electrical plants and manufactories in England and on the Continent. He has returned with much valuable information.

An important advance has been made during the past year by the establishment of a graduate course in electrical engineering, open only to students who have completed our own or an equivalent undergraduate course, and leading to the degree of Master of Science. The studies included are almost entirely in advance of any now given in the Institute, and embrace a severe course of advanced study in theoretical and applied electricity, mathematics, and machine design.

Biology.

The appointment of an additional instructor in biology has made it possible to extend and materially improve the course in industrial microscopy which has long been a useful feature of the work of this department. Mr. Charles-E. A. Winslow, a graduate of the Institute in the class of 1898 and a Master of Science in 1899, after two years' service as assistant in biology, has been promoted to an instructorship, and given special charge of this subject.

Professor Sedgwick's work on the "Principles of Sanitary Science and the Public Health," which he has had in hand for three years past, is now in the press of the Macmillan Company. This volume will be of much service both in

our own work of instruction and to those of our graduates who are engaged or interested in civic and sanitary administration or engineering. It is the direct outgrowth of Professor Sedgwick's lectures on the subject.

Professor Hough has published in full in the American *Journal of Physiology* his paper, "Ergographic Studies in Neuro-muscular Fatigue," giving the results of investigation on the general physiology of fatigue, made in this laboratory during the past two years. Mr. Prescott, instructor in industrial biology, has nearly ready to issue from the press of Messrs. John Wiley & Sons, the translation of an important work by Professor Jean Effront of the Zymological Institute in Brussels, on the soluble ferments, or *Enzymes*, bodies of great scientific and practical importance to brewers, vinegar manufacturers, and others engaged or interested in fermentation industries. He is making an important series of studies on the fermentation of cane juice, and the lactic-acid bacteria.

In connection with the recent remarkable advances in our knowledge of the causation of malarial or swamp fever, and the connection of mosquitoes with malaria, mention should be made of valuable investigations by one of the lecturers in this department, Mr. William Lyman Underwood, whose work on the "Drainage, Reclamation, and Sanitary Improvement of Certain Marsh Lands in the Immediate Vicinity of Boston," prepared under the general supervision of Professor Sedgwick, and published in the *Technology Quarterly* last spring, is of more than local interest and importance. A practical extension of his work was a thesis by one of the graduating class in Sanitary Engineering, showing how the improved drainage already effected on the upper marshes might readily be extended by means of tide-gates to a much larger territory between Belmont and the Mystic River.

The greatest need of the Biological Department is still the opportunity for laboratory experiments upon water and sewage and their purification, and in industrial biology,

upon a larger scale than is now possible; and it is greatly to be hoped that means may soon be found to afford these opportunities to our students of biology, sanitary chemistry, and sanitary engineering. The scientific operation and management of the great municipal filtration establishments now being introduced into many of the cities of the United States and Canada require experience and knowledge such as can be derived with the best advantage only from such opportunities for experiment and practice.

General Studies.

Professor Ripley was granted leave of absence in January for the remainder of the academic year, in order to undertake an investigation of transportation for the United States Industrial Commission. A result of this work has been the accumulation of material illustrative of traffic and financial details of railroad administration. Several important gifts have been received, as, for example, that of a large map prepared by Mr. J. C. Stubbs, traffic manager of the Allied Harriman Railroads, showing competitive transcontinental routes in the United States. This map was prepared originally for the proceedings in arbitration relative to differentials upon the Canadian Pacific Railway. Mr. Samuel M. Felton, president of the Chicago and Alton Railroad, has also secured valuable official documents for the library, including reports of the Joint Rate Inspection Bureau at Chicago.

A graduation thesis, entitled "A Statistical Study of the Negroes of Cinclare Central Factory and Calumet Plantation, Louisiana," has been accepted for publication by the Bulletin of the United States Department of Labor, as one of a series dealing with the economic status of the negro in various sections of the South.

The English Department has, by the large increase of students in the first year, been forced to have more instructors. During the first term of the present year five men besides Professor Bates have been employed, one of them having

been called in for the term only. If the number of students is to be as great in the future, some provision will need to be made for increasing the working force of the department permanently.

In second-year English a new departure has been made in having the students write, instead of the essay formerly required, a summary of each lecture in note-books which are subsequently corrected. The plan seems to be working well. This course brings out very strongly, however, the fact that a large majority of students need to be trained to read intelligently. Many of them are hardly able to take from the printed page much beyond the simplest facts; and, in general, their inability to get from literature any clear or forcible impression without the most careful help is striking and discouraging. If the present course in literature could be put into the third year and the time in the second year given to instruction in the line of clear-headed reading, the result would be better, not only in the subject itself, but in the general development of intellectual perception and appreciation.

The number of students from outside courses taking as options Course IX. literature in one form or another is about the same as last year.

Geology.

A new mineralogical collection has been arranged by Dr. Warren, to be used particularly as a reference collection by the students in second-year mineralogy. He has also brought together a collection of crystals, and is mounting them upon small stands of wood for the purpose of teaching crystallography to a greater extent from the natural crystals. A new petrographical microscope of the most approved model has been purchased for the study of thin sections of rocks. About two hundred new sections have been made for the Institute during the past year, and are now ready for use.

The arrangement and the arduous work of labelling the specimens in the palæontological collection have been carried forward in a satisfactory manner. The collection has received numerous accessions as donations. The Institute is now well prepared for giving practical instruction in this branch of geological inquiry, and there is this year a larger class in palæontology than there has been before.

The collections of building stones and of minerals which were sent to the Paris Exposition have been returned in as good condition as could be reasonably expected. The Institute is now supplied with a collection in this line which is not surpassed in any collegiate institution in this country. The Institute has also received a large and valuable collection of coals of different kinds from Colorado.

Professor Crosby spent over three months of the past summer in the West, chiefly in Colorado, Utah, Arizona, and the Yellowstone National Park. His time was mainly divided between original geological investigations and professional work in connection with mines, the latter affording excellent opportunities for the study of ore-deposits and the collection of instructive series of specimens for the Institute collection in economic geology.

The total membership of the classes taught in the department during the year is five hundred and one.

Naval Architecture.

The most notable event of the year is the decision of the Navy Department to send cadets to the Institute to receive special instruction in naval construction. A three years' course for these cadets has been adopted by the Faculty, and has received the approval of the Chief Constructor, covering the work of the third and fourth years of the regular Course in Naval Architecture, and providing for a year of graduate work. This course leads to the degree of Master of Science. At present there are three cadets at the Institute beginning this course. The course includes advanced

work in naval architecture and in warship-design and also advanced mathematics, electrical engineering, steam engineering, and marine engineering. It has a number of special courses, such as sanitation of warships, heating and ventilation of ships, and chemistry of organic materials used in ship-building.

The steady work of the department in securing drawings of ships and their engines, and other data required in ship-design, and the experience of the department in the adaptation of this material to the purposes of instruction, has made it possible to make material improvements in the teaching of ship-design without increasing the allotted time. The design of a ship is given to each student, who develops it alone, and uses it as the basis for computations of stability, strength, and other properties, as well as for instruction in construction and arrangement. Much credit for the recent development in this line is due to Mr. Leland.

The department has been fortunate in making large additions to its collection of drawings of merchant-ships and warships within the last year, and now has a systematized and catalogued file of drawings of ships of various types, arranged so that they may be used, as are such collections in the drawing offices of ship-yards, as a basis for ship-design. Through the liberality of the Navy Department the file of warship drawings is sufficiently complete for purposes of instruction; and this file will doubtless be kept up to date as new work for the Navy is completed. The aid of friends of the Institute is desired to increase the file of merchant-ship drawings, especially of recent ships.

Several models of ships have been added to our collection, notably of several sailing-ships and steamships of recent design presented by Dr. C. G. Weld, and of several wooden ships of about 1840 presented by Mr. C. B. Appleton. The department has added to its collection of instruments a pelorus by Ritchie, an integraph by Coradi, and some integrators by Amsler.

A large number of tests on steamers have been made by

students as the basis of theses. In the preparation of such work, tests were made by students of the class of 1901; and there are now five tests made or arranged for the present fourth-year class.

The work of the department is seriously hampered by the lack of room. To meet the immediate needs of the department, all the allotted space has been thrown into one drawing-room, the model and instrument room, which was also used for storing and caring for drawings and notes, being thereby sacrificed. Even if there were room (as there is not) for drawing-cases in the open drawing-room, our drawings could not be placed in such cases, as all the important drawings were given as confidential information; and the drawings of warships are furnished with that explicit statement. The addition of another professor to the staff of the department calls for a proper private office; and, as the work of the cadets proceeds, it will be desirable, if not imperative, that those in the higher classes be given special facilities and opportunity for uninterrupted work.

It is a matter of congratulation that our graduates have so generally found desirable employment in their profession in private ship-yards or in connection with other shipping interests, and in the bureaus of construction and steam engineering of the Navy Department. Already some of the older men are taking positions of responsibility.

The facilities which have been given for mold-loft work at the Navy Yard have gradually been restricted by the increased activity accompanying the growth of the Navy, until the Institute must look to some way of providing for this important work within its own walls. Methods consonant with the latest practice in some of our best ship-yards may be provided without demanding space beyond the possibilities of the Institute, and steps in that direction should be taken soon if this work is to proceed.

Modern Languages.

The increasing size of the sections and the addition of new courses in Spanish, to meet a growing demand, have greatly increased the work of the department. In view of the fact that instruction in a living language depends less on home work and written examinations than on the direct influence of the individual teacher, the sections in modern languages, to attain the best results, ought not to exceed twenty pupils.

It is gratifying to note the extent to which members of the department are engaging in literary or philological work, in addition to their teaching. The second edition of Professor Rambeau's "Chrestomathie Française," with an introduction upon French pronunciation and the phonetic method, appeared last June; and Professor Rambeau has brought home from France additional material for his history of the French drama. Besides the publications of other members of the department noted elsewhere, the following works are in preparation: a German grammar, by Professor Dippold; Storm's "Geschichten aus der Tonne," edited by Professor Vogel; "Una en Otra," by Fernán Caballero, edited with an introduction, notes, and vocabulary by Mr. Erhardt; and Pierre Loti's "Pêcheur d'Islande," edited by Mr. Goodell.

Mechanic Arts.

The total number of students taking instruction in mechanic arts is two hundred and ninety-four. Many of these take work in more than one subject.

The total numbers of students since 1897–98 are as follows: —

1897–98	210
1898–99	231
1899–00	238
1900–01	272
1901–02	294

The number of students attending the various classes in mechanic arts in the Summer School was twenty-nine.

The machine shop accommodates twenty-three students, and is now filled by the class in machine-tool work, having two sections of twenty-three students each. As was the case last year, several students desiring to take the work had to be excluded on account of lack of lathe equipment. Should the present rate of increase in numbers continue, another section in this subject, necessitating some rearrangement of other courses, will be needed, or some additional lathes will need to be provided.

Instruction rooms similar to that of the machine shop are very much needed and should be provided for the woodworking and forging departments.

The old Brainard milling machine has been exchanged for a modern machine of the same make. A new arbor press and a straightening press have been added to the equipment of the machine shop.

PUBLICATIONS OF MEMBERS OF THE INSTRUCTING STAFF.

Civil and Sanitary Engineering.

G. F. SWAIN.—Reports on Steam and Street Railway Bridges. *Report of the Massachusetts Railway Commission*, pp. 39–44, 80–82. January, 1901.

C. F. ALLEN.—To what Extent and in what Direction is it Desirable for a Professor of Engineering to accept Engineering Employment? *Proceedings of the Society for the Promotion of Engineering Education*, Vol. IX. p. 227.

A. E. BURTON with J. F. HAYFORD, C.E., of the U. S. Coast and Geodetic Survey. Test of the Massachusetts Institute of Technology Tape Apparatus. *Technology Quarterly*, Vol. XIV. pp. 82–88.

F. P. MCKIBBEN.—Fire and Loading Test on a Columbian Fire-proof Floor. *Engineering News*, November 23, 1901.

Mechanical Engineering.

G. LANZA.—Notes on Friction. Revised edition.

G. LANZA.—Laboratoires de l'Institute of Technology à Boston. An abstract is published in the *Proceedings of the Congrès International de Mécanique appliquée*, Paris, 1900.

E. F. MILLER (Editor).—Results of Tests made in the Engineering Laboratories, Number XIII. *Technology Quarterly*, September, 1901.

J. C. RILEY.—The Pulsometer Steam Pump. *Technology Quarterly*, Vol. XIV., No. 3.

Mining Engineering and Metallurgy.

R. H. RICHARDS.—Progress of Gold Milling during 1900. *The Mineral Industry*, Vol. IX. p. 353.

R. H. RICHARDS.— Review of the Literature of Ore-dressing in 1900. *The Mineral Industry*, Vol. IX. p. 731.

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W. L. UNDERWOOD.— On the Drainage, Reclamation, and Sanitary Improvement of Certain Marsh Lands in the Immediate Vicinity of Boston. *Technology Quarterly*, Vol. XIV. No. 1, March, 1901.

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W. O. CROSBY.— Geological History of the Hematite Iron Ores of the Antwerp and Fowler Belt in New York. *Technology Quarterly*, September, 1901.

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A. RAMBEAU.— Chrestomathie Française. Second Edition.

A. RAMBEAU.— Castilian Pronunciation. *Maître Phonétique,* October and November, 1901.

F. VOGEL.— "Lichtenstein" von Wilhelm Hauff. Edited with introduction and notes.

F. H. DIKE.— "Monsieur Bergeret." Extracts from the series "L'Histoire contemporaine," by Anatole France. Edited with introduction and notes.

R. R. GOODELL.— "L'Enfant Espion," and other stories.

THE LIBRARIES.

The total number of additions to the libraries during the year 1900–01 was 4,567, of which 1,376 were by purchase, 920 from the bindery, and 2,271 were gifts. After deducting books counted twice, etc., the total net increase in the size of the library amounts to 3,567 volumes, 803 pamphlets, and 105 maps. The distribution and cost of these is shown in the following table.

TABLE OF THE NET ACCESSIONS FOR THE YEAR 1900–01, WITH THE COST OF THE SAME, AND THE TOTAL CONTENTS OF THE LIBRARIES OF THE INSTITUTE, SEPT. 30, 1901.

LIBRARIES.	Net Increase.				Total Contents.	
	Volumes.	Pamphlets.	Maps.	Cost.	Volumes.	Pamphlets and Maps.
General Library. General	361	208	1	$117.22	4,935	3,973
General Library. English	111	2	—	203.48	2,782	40
General Library. Modern Languages	98	—	1	284.67	932	24
General Library. Military Science	170	—	—	15.50	320	7
Totals	740	210	2	$620.87	8,969	4,004
Architecture	174	3	—	578.98	2,813	213
Biology	164	33	—	258.43	2,535	466
Chemistry	424	41	—	741.38	8,368	1,638
Engineering	589	204	7	894.63	10,081	3,994
Geology	114	53	94	110.89	2,188	974
History and Economics	651	110	1	479.09	10,808	3,336
Mathematics	83	15	—	251.11	1,118	191
Mining	350	64	1	415.48	2,939	494
Physics	277	70	—	501.38	6,982	820
Margaret Cheney Room	1	—	—	—	617	13
Totals	3,567	803	105	$4,852.24	57,418	16,143

The number of serial publications received regularly by the Institute during the year 1900–01 was 798, not including a large number of official reports and bulletins, school catalogues, and the like, which are also received regularly and duly recorded and catalogued. The following table shows the distribution of the serials, exclusive of most of the official reports.

TABLE OF PERIODICALS AND OTHER SERIAL PUBLICATIONS RECEIVED DURING THE YEAR 1900–01.

LIBRARIES.	Number Received.					Estimated Cost.			
	Gifts.	Charged to Department.	Periodical Account.		Totals.	Departmental Accounts.	Periodical Account.		Totals.
			Exch.	Subs.			Exch.	Subs.	
General	1	13	14*	40	68	$61.12	$31.20	$126.06	$213.18
Architecture	7	10	2	34	53	57.73	4.80	173.49	235.22
Biology	5	7	17*	37	66	24.32	33.60	226.66	278.98
Geology	7	2	3	9	21	13.20	7.20	39.96	59.16
Chemistry	16	27	17	31	91	87.75	40.80	166.18	287.93
Engineering	19	38	66*	55	178	101.65	156.00	230.93	462.58
History and Economics	40	62	4	54	160	115.76	9.60	203.94	327.70
Mathematics	1	—	—	17	18	—	—	63.33	65.33
Mining	11	3	22	23	59	6.83	52.80	88.69	139.52
Physics	15	15	27*	24	81	55.13	60.40	117.45	224.58
Mass. School of Design	—	—	—	3	3	—	—	10.00	10.00
Totals	122	177	172	327	798	$523.49	$398.40	$1,845.09	$2,368.58

The expenditures for the libraries, exclusive of salaries, were as follows: —

Books and binding	$4,852.24
Periodicals	1,923.00
Supplies	141.46
	$6,916.70
Less receipts from the sale of duplicates	130.00
Total	$6,786.70

The General Catalogue contained on September 30 the very considerable number of 53,110 cards, of which 3,316

*More than one publication received in exchange for a single copy of the *Quarterly*.

had been added during the year. There were issued during the year 1,121 orders for new books and 1,135 for binding. In three of the libraries the number of books borrowed during the year was as follows: —

General Library	1,165
Engineering "	1,046
Chemical "	1,894

Among the most noteworthy gifts of the year may be mentioned three handsome volumes on the Eiffel Tower from M. G. Eiffel; from Edward Whymper, Esq., a set of his works; and from Mrs. F. A. Walker, 197 volumes from General Walker's library. We have also received from Mr. John J. May 24 volumes on chemistry, geology, and surveying from the library of the late William C. May of the class of 1873; and Mrs. Dwight N. Marble has presented to the Institute 19 volumes, and a number of. pamphlets formerly belonging to her husband, who was of the class of 1895.

STATISTICS.

The Corps of Instructors.

The catalogue of this year shows the number of instructors of all grades to be 149, inclusive of those concerned with the mechanic arts, but exclusive of those who are announced as lecturers for the year only. The addition of these raises the total to 189. This year's catalogue will show a decrease of two in the number of lecturers and some changes in the grades of professors and instructors. Without counting lecturers, the number of instructors to that of students bears the proportion of one to nine and five-tenths. The following table shows the distribution among the several classes of instructors, in comparison with last year: —

	1900–01.	1901–02.
Professors	25	29
Associate Professors	11	9
Assistant Professors	27	25
Instructors	44	50
Assistants	32	36
Lecturers	42	40
Total	181	189

Students and Graduates.

The registration of this year, as shown by the catalogue, amounts to 1,415. The following table shows the registration of successive years from the foundation of the Institute: —

Year.	No. of Students.	Year.	No. of Students.
1865–66	72	1869–70	206
1866–67	137	1870–71	224
1867–68	167	1871–72	261
1868–69	172	1872–73	348

Year.	No. of Students.
1873–74	276
1874–75	248
1875–76	255
1876–77	215
1877–78	194
1878–79	188
1879–80	203
1880–81	253
1881–82	302
1882–83	368
1883–84	443
1884–85	579
1885–86	609
1886–87	637
1887–88	720
1888–89	827
1889–90	909
1890–91	937
1891–92	1,011
1892–93	1,060
1893–94	1,157
1894–95	1,183
1895–96	1,187
1896–97	1,198
1897–98	1,198
1898–99	1,171
1899–1900	1,178
1900–1901	1,277
1901–1902	1,415

Students by Classes.

The aggregate number of students for 1901–02 is divided among the several classes, as follows: —

Fellows	7
Graduate students, candidates for advanced degrees	9
Regular student, Fourth Year	175
" " Third "	179
" " Second "	236
" " First "	396
Special students	413
Total	1,415

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

Class.	Regular.	Special.	Total.
Fellows and Graduates of the M.I.T.	16	—	16
Fourth Year	175	93	268
Third Year	179	142	321
Second Year	236	134	370
First Year	396	44	440
Total	1,002	413	1,415

The Courses of Instruction.

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

Year.	Civil Engineering.	Mechanical Engineering.	Mining Engineering and Metallurgy.	Architecture.	Chemistry.	Electrical Engineering.	Biology.	Physics.	General Course.	Chemical Engineering.	Sanitary Engineering.	Geology.	Naval Architecture.	Total.
4th Year Class .	24	41	14	16	13	31	5	1	3	10	7	—	10	175
3d " "	31	34	35	10	9	26	1	1	1	9	5	1	16	179
2d " "	47	54	27	14	13	39	—	11	5	11	2	—	13	236
Total	102	129	76	40	35	96	6	13	9	30	14	1	39	590

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

Year.	Civil Engineering.	Mechanical Engineering.	Mining Engineering and Metallurgy.	Architecture.	Chemistry.	Electrical Engineering.	Biology.	Physics.	General Course.	Chemical Engineering.	Sanitary Engineering.	Geology.	Naval Architecture.	Total.
1891	81	104	17	33	23	108	11	5	19	28	9	3	—	441
1892	76	106	19	37	35	112	9	5	16	34	5	3	—	457
1893	78	97	22	50	39	141	4	10	19	31	10	2	8	511
1894	88	111	19	48	50	137	5	9	19	35	13	1	20	556*
1895	88	118	25	67	59	126	7	11	14	25	10	3	22	575
1896	99	117	24	65	66	106	7	11	11	34	8	—	25	573
1897	109	119	38	71	60	90	8	9	10	36	7	1	26	578*
1898	93	108	52	64	64	94	6	8	12	38	7	1	33	574*
1899	99	113	60	53	58	84	8	7	11	30	14	1	38	575*
1900	89	127	69	53	50	87	6	4	8	34	17	1	38	582*
1901	102	129	76	40	35	96	6	13	9	30	14	1	39	590

The following table shows, by classes and by courses, the number of regular students who have registered themselves as electing to distribute the required studies and exercises over the period of five years: —

*Deducting those counted twice.

Year.	Total.	Course.												
		I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.
1st . . .	2	—	—	—	—	—	—	—	—	—	—	—	—	—
2d . . .	4	1	2	—	—	—	1	—	—	—	—	—	—	—
3d . . .	4	—	—	2	—	—	1	—	—	—	—	—	—	1
4th . . .	17	4	2	3	—	—	3	—	—	—	3	—	—	2
5th . . .	8	1	4	—	—	—	3	—	—	—	—	—	—	—
	35	6	8	5	—	—	8	—	—	—	3	—	—	3

Classification of Special Students.

Our special students can, of course, not be classified systematically; but the following table exhibits the number of such students pursuing certain leading lines of study: —

Applied Mechanics	115	History	100
Architecture	44	Language	192
Biology	26	Mathematics	180
Chemistry	153	Mechanic Arts	93
Civil Engineering	103	Mechanical Engineering . . .	120
Drawing	155	Mining Engineering	39
Electrical Engineering . . .	33	Naval Architecture	11
English	139	Physics	255
Geology	57	Political Science	97

The following is the number of students, either regular or special, pursuing certain leading branches of study, in each of the four years: —

	First Year.	Second Year.	Third Year.	Fourth Year.	Total.
Mathematics	433	316	133	4	886
Chemistry	447	54	108	75	684
English	391	318	23	5	737
French	203	127	58	—	388
Physics	—	345	317	166	828
German	124	247	171	1	543
Mechanic Arts . . .	6	146	55	56	283

Summer Courses.

The attendance at summer courses this year was as follows: —

Mechanical Drawing and Descriptive Geometry (Professor Faunce),	53
Mathematics: Analytic Geometry (Mr. Passano)	17
Architecture:	
(*a*) Shades and Shadows (Mr. Gardner)	5
(*b*) Elementary Design (Mr. Gardner)	6
Chemistry:	
(*a*) General Chemistry (Mr. Phelan)	23
(*b*) Analytical Chemistry (Mr. Hall)	12
(*c*) Organic Analysis (Dr. Mulliken)	7
(*d*) Organic Chemistry (Dr. Mulliken)	3
Physics:	
(*a*) Mechanics, Light, and Electricity (Dr. Wendell)	37
(*b*) Heat (Professor Clifford)	19
(*c*) Physical Laboratory (Dr. Goodwin)	6
Modern Languages:	
(*a*) French (Mr. Blachstein)	3
(*b*) German (Professor Vogel)	12
Mechanism (Professor Park)	23
Mechanical Engineering Drawing (Professor Park)	19
Mechanic Arts:	
(*a*) Woodwork (Mr. Merrick)	5
(*b*) Forging (Mr. Lambirth)	3
(*c*) Chipping and Filing (Mr. Smith)	2
(*d*) Machine-tool Work (Mr. Smith)	15
(*e*) Metal Turning (Mr. Smith)	3
English Composition (Mr. Robinson)	1

Residence of Students.

States.	Candidates for Advanced Degrees.	Fourth Year.	Third Year.	Second Year.	First Year.	All Regular Students.	Special Students.	Total.
Alabama	—	1	—	—	—	1	1	2
Arkansas	—	—	—	1	—	1	—	1
California	—	—	1	2	2	5	4	9
Colorado	—	1	1	—	—	2	4	6
Connecticut	1	6	4	7	11	29	13	42
Delaware	—	—	1	—	1	2	1	3
Dist. of Columbia,	—	2	2	5	2	11	3	14
Florida	—	—	—	1	—	1	—	1
Georgia	—	1	—	—	2	3	1	4
Hawaiian Islands,	—	—	—	—	—	—	—	—
Idaho	—	—	—	1	—	1	—	1
Illinois	—	7	9	7	7	30	14	44
Indiana	—	5	2	2	2	9	2	11
Iowa	—	1	2	2	2	5	3	8
Kansas	—	—	—	—	—	—	1	1
Kentucky	—	—	—	—	5	5	4	9
Louisiana	—	—	—	—	—	—	1	1
Maine	—	2	5	6	9	22	8	30
Maryland	—	1	2	4	3	10	6	16
Massachusetts	13	114	99	145	254	625	212	837
Michigan	—	2	2	1	2	7	5	12
Minnesota	—	2	2	—	2	6	4	10
Missouri	—	1	1	1	8	11	8	19
Montana	—	—	1	1	—	2	2	4
Nebraska	—	1	—	1	—	2	1	3
Nevada	—	—	—	—	—	—	—	—
New Hampshire	—	2	5	5	8	20	11	31
New Jersey	—	3	—	1	1	5	1	6
New York	1	6	8	17	22	54	25	79
North Carolina	—	—	1	1	1	3	3	6
Ohio	1	—	4	4	8	17	10	27
Oregon	—	—	—	—	1	1	1	2
Pennsylvania	—	5	8	5	6	24	12	36
Porto Rico	—	—	—	—	—	—	1	1
Rhode Island	—	3	6	5	9	23	15	38
South Carolina	—	—	—	—	1	1	—	1
South Dakota	—	—	—	1	—	1	—	1
Tennessee	—	—	—	—	1	1	—	1
Texas	—	—	—	1	—	1	1	2
Utah	—	—	—	—	1	1	—	1
Vermont	—	2	1	—	2	5	1	6
Virginia	—	—	—	1	—	1	—	1
Washington	—	—	—	—	1	1	—	1
West Virginia	—	—	—	1	1	2	1	3
Wisconsin	—	—	—	—	1	1	—	1
	—	—	—	—	3	3	5	8
Foreign Countries.								
Austria	—	—	—	—	—	—	1	1
Bermuda	—	—	—	—	—	—	1	1
Brazil	—	—	—	—	1	1	1	2
Chili	—	—	—	—	1	1	2	3
China	—	—	—	—	—	—	1	1
Cuba	—	—	—	—	—	—	1	1
Denmark	—	—	—	—	—	—	1	1
England	—	—	—	—	—	—	1	1
France	—	—	—	—	—	—	1	1
Germany	—	—	—	—	1	1	—	1
Jamaica	—	—	—	—	1	1	2	3
Japan	—	—	—	—	—	—	1	1
Mexico	—	—	—	—	—	—	2	2
New Brunswick,	—	—	—	—	—	—	4	4
Nova Scotia	—	—	—	—	—	—	1	1
Ontario	—	—	—	—	2	2	1	3
Quebec	1	—	—	—	—	—	1	1
Russia	—	—	—	—	—	—	1	1
Turkey	—	—	—	—	1	1	—	1
Total	16	175	179	236	396	1,002	413	1,415

Forty-two States of the Union, besides the District of Columbia and Porto Rico, are represented on our list of students. Of the total number of 1,415, 837 are from Massachusetts, or 59.2 per cent. of the whole; 156 are from other New England States; 422 are from outside New England. Of these, 43 are from foreign countries.

A table showing the number of students in each year, from 1895, coming from each State or Territory, and from each foreign country, may be not without interest and instruction: —

States.	1895.	1896.	1897.	1898.	1899.	1900.	1901.
Alabama	–	1	1	1	–	1	2
Arkansas	–	1	1	–	–	1	1
California	8	9	9	11	9	10	9
Colorado	7	7	8	8	7	8	6
Connecticut	27	24	30	26	29	35	42
Delaware	5	5	6	3	4	4	3
Dist. of Columbia	16	17	13	8	7	13	14
Florida	1	–	1	–	1	1	1
Georgia	2	3	4	4	3	3	4
Hawaiian Islands	–	–	–	1	–	1	–
Idaho	1	1	1	–	–	–	1
Illinois	42	45	40	51	36	39	44
Indiana	2	3	7	3	5	7	11
Iowa	12	14	12	7	6	10	8
Kansas	4	3	3	–	–	–	1
Kentucky	11	12	10	10	4	5	9
Louisiana	2	–	1	1	1	2	1
Maine	38	27	24	19	25	22	30
Maryland	9	9	8	8	8	13	16
Massachusetts	721	730	739	719	731	779	837
Michigan	7	6	5	9	10	8	12
Minnesota	5	7	8	11	10	7	10
Missouri	9	11	6	10	11	13	19
Montana	1	3	5	2	3	5	4
Nebraska	2	2	2	1	3	4	3
Nevada	–	–	–	–	1	1	–
New Hampshire	30	26	25	25	29	26	31
New Jersey	5	13	15	13	12	8	6
New Mexico	1	–	–	–	–	–	–
New York	64	69	62	68	61	68	79
North Carolina	–	1	1	2	2	2	6
Ohio	37	28	30	23	27	27	27
Oregon	1	4	3	3	2	1	2
Pennsylvania	36	42	41	34	33	37	36
Rhode Island	21	20	19	23	32	35	38
South Carolina	5	6	4	1	1	1	2
South Dakota	–	–	–	–	1	1	2
Tennessee	1	1	3	3	4	6	4
Texas	3	2	2	1	2	4	7
Utah	5	2	3	5	6	7	7
Vermont	5	7	11	12	12	15	15
Virginia	5	3	4	3	2	3	5
Washington	1	5	4	7	4	2	4
West Virginia	3	2	1	–	1	1	1
Wisconsin	7	6	6	8	7	8	11
Wyoming	–	1	–	–	–	–	–
Foreign Countries.							
Austria	–	–	–	–	–	–	1
Belgium	–	–	–	–	–	–	–
Bermuda	–	–	–	–	–	1	2
Brazil	1	–	–	–	–	–	4
Bulgaria	–	–	–	–	–	–	–
Cape Breton	–	–	–	1	–	–	–
Central America	1	–	–	–	–	–	–
Chili	1	1	–	–	–	–	1
China	–	–	–	–	–	–	1
Columbia	–	–	–	–	–	–	–
Cuba	3	2	1	1	–	–	1
Denmark	–	–	2	1	1	1	1
Dutch Guiana	–	–	–	1	1	–	–
England	2	2	2	4	1	3	3
France	–	1	1	1	2	4	1
Germany	–	–	–	1	1	2	3
Guatemala	–	–	–	–	–	–	–
Holland	–	–	–	–	–	–	–
Ireland	–	–	–	–	–	–	–
Jamaica	–	–	–	–	1	1	1
Japan	2	2	–	1	2	2	2
Mexico	1	3	6	7	7	7	7
New Brunswick	1	2	2	3	3	2	2
New South Wales	1	–	–	–	–	–	–
Nova Scotia	2	1	1	2	–	2	6
Ontario	2	2	–	–	–	–	3
Peru	–	–	–	–	–	–	–
Porto Rico	1	–	–	–	–	–	1
Quebec	2	2	2	1	3	4	2
Russia	–	–	–	–	1	1	1
Scotland	–	–	–	–	–	–	–
Spain	1	–	–	–	–	–	–
Trinidad	–	–	–	–	–	–	–
Turkey	3	1	3	3	3	3	1
Venezuela	1	1	–	–	–	–	–
Total	1,187	1,198	1,198	1,171	1,178	1,277	1,415

Residence of Massachusetts Students.

It has been said that 59.2 per cent. of our students are from Massachusetts. All the counties of the State except Dukes send students to the Institute. One hundred and thirty-four cities and towns are on the lists. The first column of the following table shows the number of cities

and towns in each county sending pupils: the second column gives the aggregate number from each county. It appears that Middlesex sends two hundred and forty-six, and Suffolk two hundred and forty-four pupils; Essex comes third, with one hundred and twenty-nine; Norfolk, fourth, with eighty-four.

County.	No. of Towns.	No. of Students.	County.	No. of Towns.	No. of Students.
Barnstable	4	7	Middlesex	31	246
Berkshire	3	3	Nantucket	1	1
Bristol	10	27	Norfolk	19	84
Essex	23	128	Plymouth	15	44
Franklin	5	9	Suffolk	4	244
Hampden	3	16	Worcester	13	25
Hampshire	3	3			
			Total	134	837

The following is a list of the towns, fifty-nine in number, which send five or more students to the Institute:—

Boston	227	Waltham	11	Marlboro	7
Newton	49	Arlington	10	Winchester	7
Cambridge	31	Medford	10	Dedham	6
Newburyport	25	Melrose	10	Middleboro	6
Brookline	23	Springfield	10	New Bedford	6
Salem	23	Taunton	10	Wellesley	6
Somerville	21	Hyde Park	9	Belmont	5
Lawrence	18	Framingham	8	Concord	5
Lowell	18	Gloucester	8	Greenfield	5
Lynn	17	Quincy	8	Holyoke	5
Brockton	13	Canton	7	Stoneham	5
Chelsea	12	Fitchburg	7	Wakefield	5
Malden	11	Haverhill	7	Weymouth	5

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

Year.	(1) Total No. of Students.	(2) No. of Students in the catalogue of the previous year who remain in the Institute.	(3) No. of New Students entering before issue of catalogue.	(4) Of those in column (3) the following number are regular First-year Students.	(5) No. of New Students not of the regular First-year Class.
1892–93	1,060	618	442	303	139
1893–94	1,157	701	456	301	155
1894–95	1,183	768	415	271	144
1895–96	1,187	778	409	266	143
1896–97	1,198	758	440	263	177
1897–98	1,198	757	441	277	164
1898–99	1,171	769	402	278	124
1899–1900	1,178	764	414	275	139
1900–1901	1,277	789	488	312	176
1901–1902	1,415	844	571	396	175

Ages of Students.

The next table exhibits the ages of our students upon entrance, after taking out two who are repeating the first year, and seventeen persons of unusual ages. These deductions leave three hundred and seventy-seven as the number of students whose ages have been made the subject of computation.

Period of Life.	1900–1901.		1901–1902.	
	Half-year Groups	Yearly Groups.	Half-year Groups.	Yearly Groups.
16 to 16½ years	1	—	—	—
16½ to 17 "	4	5	4	4
17 to 17½ "	10	—	28	—
17½ to 18 "	41	51	48	76
18 to 18½ "	53	—	47	—
18½ to 19 "	65	118	66	113
19 to 19½ "	55	—	73	—
19½ to 20 "	30	85	41	114
20 to 20½ "	25	—	31	—
20½ to 21 "	18	43	24	55
21 to 22 "	7	7	15	15
	309	309	377	377

The results appear in the table above in comparison with the corresponding results of 1900–1901.

From the foregoing it appears that the average age on entrance is eighteen years and ten months.

In this connection are presented the ages, at graduation, of the class leaving us in June. The one hundred and ninety-two members of the class were distributed among the different periods of life as follows: —

Under 20½	—
Between 20½ and 21	2
" 21 " 21½	8
" 21½ " 22	13
" 22 " 23	54
" 23 " 24	53
" 24 and over	62
Total	192

The special students this year constitute twenty-nine per cent. of the whole body, as against twenty-seven per cent. last year and twenty-six per cent. the year before.

Graduate Students.

The number of students who are graduates of this and other institutions is one hundred and twenty-two. Of these sixteen are our own graduates, nine being candidates for advanced degrees.

One hundred and six are graduates of other institutions, pursuing courses of study with us either as regular or as special students. Thirteen are graduates of Harvard University; six of Yale University; four each, of Amherst College and Brown University; three each, from Columbia and Johns Hopkins Universities and the United States Naval Academy; two each, of Boston, Chicago, Southwestern Presbyterian, Virginia, and Wisconsin Universities, Boston, Christian Brothers, Colby, Davidson, Mt. Holyoke, Neuchâtel, Smith, and Texas Agricultural and Mechanical Colleges; one each, of Acadia, Alabama, Baylor, Cambridge,

Catholic University of America, Cornell, California, Denison, Illinois, Lincoln, Nebraska, Northwestern, Rochester, South, Washington, and Washington and Lee Universities, and of Acadia, Augustana, Beloit, Bowdoin, Canisius, Central, Connecticut Agricultural, Detroit, Earlham, Gallaudet, Grove City, Iowa State, Mt. Alison, the Michigan College of Mines, Oberlin, Pomona, Pennsylvania State, Randolph-Macon, St. Joseph's, St. Ignatius, St. Xavier, Trinity, Tufts, Vassar, Villanova, Wellesley, and Williams Colleges.

Women Students.

The number of women pursuing courses with us is forty-nine. Of these five are graduates of colleges. Of the total number, five are regular students of the fourth year, six of the third year, five of the second year. Thirty-three are special students. Of the sixteen regular students of the upper classes, five take Course IV., Architecture; five, Course V., Chemistry; three, Course VII., Biology; two, Course VIII., Physics; and one, Course IX., General Studies. Of the special students, fourteen devote themselves to biology, four to chemistry, four to general studies, two to physics, one to naval architecture, one to geology, and four to architecture, while three are first-year specials.

Statistics of Admission.

Of the 1,415 students of the present year, 571 were not connected with the school in 1900–1901. Of these 358 were admitted as regular students of the first year upon the basis of their entrance examinations. The 213 remaining comprise (1) those who had previously been connected with the Institute, and have resumed their places in the school; (2) those who were admitted provisionally without examination; (3) those who were admitted by examination as regular second-year or as special students; (4) those who were admitted on the presentation of diplomas or certificates from other institutions of college grade or from the College

Examination Board. In addition to the 358 who were thus admitted to the first year on examination, and have taken their place in the school, 70 were admitted on examination, but have not entered the school.

In the case of the 358 persons who were admitted on examination, and have joined the school, the results of the examinations, embracing both those of June and those of September, were as follows: —

Admitted clear	264
" on one condition	70
" on two conditions	22
" on more than two conditions	2
	358

Fifty-three applicants were rejected.

Entrance Examinations at Distant Points.

In addition to the entrance examinations held at Boston in July and September, examinations were conducted in July at Austin (Tex.), Baltimore, Belmont, Binghamton (N.Y.), Buffalo, Chapel Hill (N.C.), Chicago, Cincinnati, Denver, Detroit, Exeter (N.H.), Indianapolis, Kansas City (Mo.), Lead (S.D.), Louisville, New York, North Adams, Philadelphia, Pittsburg, Portland (Ore.), Portland, (Me.), Pottstown, Rochester, St. Louis, St. Paul, Springfield (Mass.), Syracuse, and Washington, and also in London (England).

Graduates by Courses.

The following table exhibits the number of persons who have graduated within each of the several courses since the foundation of the school: —

Year.	Civil Engineering.	Mechanical Engineering.	Mining Engineering.	Architecture.	Chemistry.	Metallurgy.	Electrical Engineering.	Natural History or Biology.	Physics.	General Course.	Chemical Engineering.	Sanitary Engineering.	Geology.	Naval Architecture.	Total.
1868	6	1	6	–	–	–	–	–	–	1	–	–	–	–	14
1869	2	2	–	–	1	–	–	–	–	–	–	–	–	–	5
1870	4	2	2	–	1	–	–	–	–	1	–	–	–	–	10
1871	8	2	5	–	2	–	–	–	–	–	–	–	–	–	17
1872	3	1	5	–	3	–	–	–	–	–	–	–	–	–	12
1873	12	2	3	1	7	–	–	–	–	1	–	–	–	–	26
1874	10	4	1	1	–	–	–	–	–	2	–	–	–	–	18
1875	10	7	6	1	1	–	–	–	1	2	–	–	–	–	28
1876	12	8	7	–	5	1	–	2	3	4	–	–	–	–	42
1877	12	6	8	4	2	–	–	–	–	1	–	–	–	–	32
1878	8	2	2	3	3	–	–	1	1	–	–	–	–	–	19
1879	6	8	3	1	3	–	–	–	–	1	–	–	–	–	23
1880	3	–	3	–	1	–	–	–	–	1	–	–	–	–	8
1881	3	5	6	3	8	–	–	1	–	2	–	–	–	–	28
1882	2	5	5	3	6	–	–	1	1	1	–	–	–	–	24
1883	3	7	5	1	3	–	–	–	–	–	–	–	–	–	19
1884	5	6	13	–	12	–	–	–	–	–	–	–	–	–	36
1885	4	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	3	8	–	17	1	1	2	–	–	–	–	75
1890	25	28	3	5	13	–	18	3	2	6	–	–	–	–	103
1891	18	26	4	6	11	–	23	3	3	1	7	–	1	–	103
1892	22	26	4	13	7	–	36	6	1	7	4	6	1	–	133
1893	25	30	5	2	8	–	41	2	–	6	8	–	2	–	129
1894	21	31	4	14	11	–	33	1	3	5	12	3	–	–	138
1895	25	30	3	15	14	–	33	–	2	4	11	4	–	5	144*
1896	25	34	10	24	17	–	48	3	3	7	7	4	3	5	189*
1897	25	40	7	16	20	–	33	2	3	7	12	4	1	9	179
1898	32	41	7	29	26	–	33	3	4	6	9	3	–	7	200
1899	30	38	9	22	21	–	32	2	2	1	9	1	–	8	173*
1900	32	33	20	21	16	–	22	3	3	5	11	4	–	9	184
1901	37	39	17	21	17	–	25	1	1	6	14	4	1	16	199†
Totals	474	560	205	218	277	1	431	40	36	85	104	33	9	59	2,532
Deduct names counted twice															14
Net total															2,518

*Deducting names counted twice.

†Including two persons awarded degrees on the date of this report.

THE SOCIETY OF ARTS.

Report of the Secretary.

To the President of the Institute:

Sir,— On behalf of the Executive Committee, I have the honor to present the annual report of the Society of Arts for the year May 10, 1900, to May 16, 1901.

The first meeting of the society for the present year was held on October 11, 1900, attendance being one hundred and forty-three. This shows a considerable gain over last year.

The following papers have been read: —

"Color Photography." PROFESSOR LOUIS DERR.

"Some Experiments on Architectural Acoustics." PROFESSOR WALLACE C. SABINE.

"America's Contribution to our Knowledge of the Size and Figure of the Earth." DR. HENRY S. PRITCHETT.

"Applied Science in the Textile World." PRINCIPAL W. W. CROSBY.

"Landscape Architecture in this Country." MR. GUY LOWELL.

"Shipment of Freights to Europe." MR. WILLIAM H. LINCOLN.

"Photography with the Great Visual Telescope of the Yerkes Observatory." PROFESSOR GEORGE E. HALE.

"The Designing of the Buffalo Exposition." MR. ROBERT S. PEABODY.

"A Forest Policy for the United States." MR. GIFFORD PINCHOT.

"The Use of the Microscope in the Study of the Chemical Constitution and Physical Properties of Metals." DR. HENRY FAY.

"Electrical Wave Transmission." PROFESSOR M. I. PUPIN.

"The Increase of the Food Supply of Mankind through the Cultivation of Marine Animals: A Problem in Economic Zoölogy." DR. GEORGE W. FIELD.

"Principles of Action of Various Types of Refrigerating Machines." PROFESSOR J. E. DENTON.

"Cotton from Seed to Bale." MR. HENRY G. KITTREDGE.

At the beginning of the year the Associate Membership was three hundred and ninety-nine. Of this number one has died, nine resigned, twenty-six have, however, been elected, making the present membership three hundred and fifty-six.

During the year the society has suffered the loss of one of its oldest members, Mr. Thomas Gaffield, who served on the Executive Committee from 1879 to 1883. Mr. Gaffield's interests were not confined to the welfare of the Society of Arts alone, but were extended also to that of the Institute, as evinced by his gift of books, specimens of glass and minerals to the Departments of Geology and Chemistry. At the time of his death he was a member of the Corporation of the Institute.

No change has occurred in the management of the *Technology Quarterly*. Since the last annual report twenty-five articles have been published in the *Quarterly*. Probably the most notable article is one on the Eclipse Expedition of the Massachusetts Institute of Technology to Washington, Ga., under the direction of Professor Alfred E. Burton. Illustrating this article is an excellent photogravure reproduction of one of the best photographs of the sun's corona that has ever been taken. This article has been followed by one from Rev. Professor William F. Rigge, S.J., who also observed the eclipse at Washington, Ga., being in charge of a party from Creighton University, Nebraska. In this paper Professor Rigge makes an interesting comparison between his results and those obtained by the party from the Institute, all of which redounds to the credit of both parties. Professor W. O. Crosby has contributed two articles giving the results of his explorations of the sites of proposed water supplies for New York and Brooklyn.

A gratifying instance of the loyalty of our alumni is furnished by the frequency of the contributions of two graduates of the Institute, Messrs. George C. Whipple and Daniel D. Jackson. They are actively engaged in an investigation of problems connected with the biology and physi-

cal characters of the water supplies of towns, and have contributed four articles on different branches of this subject.

Among other articles from the Physical Department, are an account of a series of tests made by Professor Norton on Fire Retardent Materials, and a series on diffusing glass of various kinds used in windows; and from Mr. W. Lincoln Smith an account of an extensive series of Tests of Certain Shades and Globes for Electric Lights as used in Interior Illumination. From the Mechanical Engineering Department the usual annual contribution of Results of Tests made in the Engineering Laboratories was published in the September issue. Professor Fay and Mr. Badlam contributed an important article on the Effect of Annealing upon the Physical Properties and the Microstructure of a Low Carbon Steel; and the Review of American Chemical Research, contributed by a number of members of the Chemical Department, has appeared regularly in each issue. Beginning with the current volume, a change has been made in the paper used in printing the *Quarterly;* and it is hoped that some saving of expense will result.

At the last meeting of the year the thirty-ninth annual meeting, Messrs. George W. Blodgett, Desmond FitzGerald, Edmund H. Hewins, Charles T. Main, and James P. Munroe were re-elected members of the Executive Committee, and Mr. George V. Wendell was re-elected Secretary for the year 1901–1902.

Respectfully submitted,

GEORGE V. WENDELL,
Secretary.

DECEMBER 4, 1901.

GENERAL STATEMENT

OF THE

RECEIPTS AND DISBURSEMENTS BY THE TREASURER

FOR THE YEAR ENDING SEPT. 30, 1901

STATEMENT OF THE TREASURER.

The Treasurer submits the annual statement of the financial affairs of the Institute for the year ending Sept. 30, 1901.

There has been a large increase in the amount received from students' fees, the total this year being about $21,000 greater than last year; but this has been offset by an increase in the amount paid for salaries, for labor, for general expenses, for fuel, for department supplies and other items, so that the net result is an excess of expenditure over income to the amount of $9,590.26,— a deficit about $1,000 greater than last year.

The following legacies and gifts have been received: —

Through the generosity of W. Austin Wadsworth, Esq., and Herbert Wadsworth, Esq., $20,000 has been added to the Edward Austin Fund. From the estate of the late Robert C. Billings has come a legacy of $50,000 for scholarship purposes. $1,655.45 has been added to the Susan E. Dorr Fund. $10,000 for scholarship purposes has been received from the estate of the late Henry Saltonstall, and $40,000 more as a fund for general purposes. $5,000 has been added to the Henry L. Pierce Fund. $1,000 was left to the Institute by the late Miss Rebecca A. Goddard. Mr. George A. Gardner has contributed $10,000 toward the new Electrical Engineering Building. A legacy of $2,000 has come from the estate of the late Barthold Schlesinger. A gift of $2,000 has been made by our ex-President, James M. Crafts. $1,114.62 has been received from the estate of the late John M. Forbes, and $500 from the estate of the late Sarah H. Forbes. Francis Blake, Esq., has contributed $500 for the purchase of apparatus for the physical department, and another friend has given $500 for certain special purposes. Mrs. William B. Rogers gave $400 for periodicals; Mr. Charles C. Jackson, $300 for general purposes; and $153.53 has been added to the Samuel E. Sawyer Fund.

The result is an increase of $99,808.46 in the property held for special purposes, and an increase of $48,000 in that for general purposes; and the net increase in the Institute's property, after deducting the excess of expenditure for the year, and certain other items, is $116,658.04.

Looking back ten years, we find that during that time the receipts from students' fees and scholarships have increased about $60,000, but during the same period the expenditures have increased nearly $139,000. This has been due in great part to the increased number of students, and to the increased demands for more advanced and more varied educational opportunities. The development of technical work and education has made necessary an amount of instruction and of laboratory apparatus far greater than that which sufficed ten years ago.

The gifts to the Institute during this period have been very generous, so that its total property has increased from $1,364,684.98 to $3,456,099.46, of which sum, however, nearly $1,400,000 is in real estate used by the Institute itself, and on the balance a much lower rate of return must now be accepted than that which was received ten years ago. In considering these amounts, the public must bear in mind that a very large proportion of this property is held for special purposes,— notably, scholarships; and such funds, while doing a most beneficent work for the students, do not enable

the Institute to meet its general expenses, since the expense of each student is considerably greater than what he pays. To raise the fees would carry them much beyond those charged in other educational institutions, and would, moreover, bear very hardly on a class of men whose work is of such high order as to entitle them to consideration both from the Institute and from the public.

Judging from the figures for this year, the increase in the number of students in the near future is likely to be very large; and there is imperative need of a large increase in funds to provide the necessary buildings and the necessary instruction.

The poverty of the Institute is the result of the excellence of its work and the reputation which it has attained. The alumni have shown a most loyal interest by contributing $100,000 toward the Walker Memorial Building, of which sum $30,000 has been already paid; but the number of Institute graduates who have been long enough at work to enable them to contribute largely to the support of the Institute is comparatively small, and it is necessary to rely still upon the generosity of the general public to enable the Institute to accomplish for the community the splendid possibilities that are opening before it.

SECURITIES SOLD OR PAID, GENERAL ACCOUNT.

$24,000 Walter Baker Co., Ltd., 4½s	$24,000.00
50,000 Ch. Junc. & U. S. Yards Inc. 5s	50,000.00
House, 34 Commonwealth Ave.	28,681.00
50 Rights Ch., Mil. & St. Paul R.R.	225.00
	$102,906.00

SECURITIES BOUGHT OR RECEIVED AS LEGACIES, GENERAL ACCOUNT.

$50,000 K. C., Fort Scott & Memphis R.R. 6s	1928	$59,640.00
50,000 Long Island R.R. 4s	1949	49,500.00
25,000 Southern Rwy. St. Louis Div. 4s	1951	24,875.00
25,000 Ozark Equipment Co. 5s	1910	25,000.00
		$159,015.00

GEORGE WIGGLESWORTH, TREASURER, *in account with*
GENERAL STATEMENT OF RECEIPTS AND DISBURSEMENTS

Dr.

Cash balance, Sept. 29, 1900		37,831.70
From Augustus Lowell for Lowell Courses	5,756.10	
" " " " C. Kastner's salary	1,458.31	
" " " " School of Design	500.00	7,714.41

RECEIPTS FOR CURRENT EXPENSES.

Income of funds for salaries	4,314.00	
" " " " scholarships (students' fees),	9,718.63	
" " " " Joy "	200.00	
" " " " Swett "	400.00	
" " " " Savage "	400.00	
" " " " W. B. Rogers	512.50	
" " " " Library	480.00	
" " " " general purposes	24,889.57	
" " Rogers Memorial Fund	10,853.00	
" " Charlotte B. Richardson Fund	1,495.15	
" " Rotch Prize Funds	400.00	
" " Rotch Architectural Fund	1,000.00	
" " Edward Austin Fund, Scholarships	6,725.00	
" " " " " Awards	3,856.55	
" " Teachers' Fund	1,200.00	
Letter Box Fund	81.37	
Students' fees	221,583.00	
State scholarships	4,000.00	
United States Act of 1862	5,468.34	
United States Act of 1890	8,333.34	
Gift of State of Massachusetts	25,000.00	
Laboratory supplies and breakages	10,844.99	
Rents, per Table (page 12)	8,729.93	
Gifts	4,814.62	
Interest	8,578.37	
Boston University	1,150.00	
Sale Printed Lecture Notes	2,805.30	367,833.66

GIFTS AND BEQUESTS FOR SPECIAL PURPOSES.

Increase Scholarship Funds	881.03	
" Teachers' Fund	2,800.00	
" Edward Austin Fund (add'l $20,000)	23,818.45	
" Susan E. Dorr Fund, additional	1,655.45	
Electrical Engineering Building Fund	10,000.00	
Henry Saltonstall Scholarship Fund	10,000.00	
Billings Student Fund	50,000.00	
Samuel E. Sawyer Fund, additional	153.53	
Sarah H. Forbes Fund	500.00	99,808.46

GIFTS AND BEQUESTS FOR GENERAL PURPOSES.

Henry L. Pierce Legacy, additional	5,000.00	
Saltonstall Fund	40,000.00	
Rebecca A. Goddard Legacy	1,000.00	
Barthold Schlesinger "	2,000.00	48,000.00

SECURITIES SOLD OR PAID.

General Fund, page 3		102,906.00

SUNDRIES.

Income credited to Bond Premium Acc't	3,585.00	
" " " Rogers Bond Premium Acc't,	810.00	
Boston Art Students' Association, on acc't	666.66	
Students' Notes paid	65.00	
Walker Memorial Fund	30,600.00	35,726.66
		$699,820.89

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

FOR THE YEAR ENDING SEPT. 30, 1901.

Cr.

Paid for Lowell Courses	5,756.10	
" " Charles Kastner's salary	1,458.31	
" " Expense Lowell School of Design	500.00	7,714.41

EXPENSES.

Salaries, per Table (page 12)	263,009.82	
" paid from Gifts	500.00	
Fellowship paid from Swett Fund	400.00	
" " " Savage "	400.00	
Edward Austin Fund, Awards	3,856.55	
Teachers' Fund, "	1,200.00	
Prizes, Rotch Funds	400.00	
Repairs, per Table (13)	9,381.28	
General Expenses, per Table (page 13)	19,331.55	
Fire Insurance	1,782 62	
Fuel	10,901.81	
Water	2,697.20	
Gas	1,917.72	
Electricity	2,039.27	
Printing and Advertising	6,254.45	
" Lecture Notes	3,330.01	
" Annual Catalogues and Reports	3,161.59	
Rents paid Boston & Albany R.R. Co.	180.00	
" " Natural History Society	200.00	
Laboratory Supplies and Libraries, per Table (p. 12)	44,256.00	
" " paid from Gifts	499.50	
Society of Arts	796.71	
Pan-American Exposition	927.84	377,423.92

(Expenses more than Income, $9,590.26)

SECURITIES BOUGHT OR RECEIVED AS LEGACIES.

General Account (page 3)		159,015.00
Walker Memorial Fund		31,788.33

SUNDRIES.

Letter Box, 1900, used	51.12	
Ann White Vose Scholarship Fund, 1900, used	7.67	
Susan E. Dorr " " "	182.37	
Notes Payable	20,000.00	
Notes Receivable	75,000.00	95,241.16
Cash balance, Sept. 30, 1901		28,638.07
		$699,820.89

The following account exhibits the property held by the Institute, as per Treasurer's books, Sept. 30, 1901:—

INVESTMENT OF THE W. B. ROGERS MEMORIAL FUND.

30,000.00	Burlington & Mo. River R.R. 4s.	1910	25,787.50	
27,000.00	Kansas City Belt R.R. 6s.	1916	27,000.00	
6,000.00	New York & New England R.R. 6s.	1905	6,000.00	
3,800.00	Republican Valley R.R. 6s.	1919	3,800.00	
4,000.00	Cin., Ind., St. Louis & Chicago R.R. 6s.	1920	4,000.00	
2,000.00	Kansas City, Fort Scott & Gulf R.R. 7s.	1908	2,000.00	
1,000.00	Lincoln & Northwestern R.R. 7s.	1910	1,000.00	
1.000.00	Atchison & Nebraska R.R. 7s.	1908	1,000.00	
35,000.00	Fort Street Union Depot 4½s.	1941	34,825.00	
24,000.00	Rome, Watertown & Ogdensburg R.R. 5s.	1922	24,000.00	
37,500.00	Detroit, G. Rapids & Western R.R. 4s.	1946	37,500.00	
25,000.00	Atchison, Top. & St. Fé R.R. 4s.	1995	24,470.00	
7,000.00	Chesapeake & Ohio R.R. 5s.	1939	7,000.00	
38,000.00	Chi. Junc. & Union Stock Yards 5s.	1915	38,000.00	
3,000.00	Chi., Mil. & St. Paul R.R. 7s.	1905	3,000.00	
	Advances to Bond Premium account		10,032.50	
	Bonds			249,415.00

INVESTMENTS, GENERAL ACCOUNT.

10,000.00	Bur. & Mo. River (Neb.) R.R. 6s., non-exempt	1918	10,000.00	
2,000.00	Bur. & Mo. River (Neb.) R.R. 6s., exempt	1918	2,000.00	
5,000.00	Chicago, Burlington & Quincy R.R 4s.	1922	4,100.00	
2,000.00	Kansas City, Fort Scott & Gulf R.R. 7s.	1908	2.000.00	
3,000.00	Hannibal & St. Joseph R.R. 6s.	1911	3,000.00	
6,000.00	West End Street Ry. 5s.	1902	6,000.00	
35,000.00	Fitchburg R.R. 5s.	1903	35,000.00	
65,000.00	Boston & Maine R.R. 4½s.	1944	65,000.00	
26,000.00	Am. Dock & Improvement Co. 5s.	1921	26,000.00	
3,000.00	Illinois Central R.R. 4s.	1951	3,000.00	
26,000.00	New York & New England R.R. 6s.	1905	26,000.00	
8,000.00	Chi. Junc. & Union S. Yards 5s.	1915	8,000.00	
5,000.00	Dominion Coal Co. 1st. 6s.	1913	5,000.00	
2,000.00	New England Tel. & Tel. Co. 6s.	1907	2,000.00	
2,000.00	New York & New England R.R. 7s.	1905	2,000.00	
100,000.00	West End Street Ry. 4s.	1917	100,000.00	
50 000.00	Utah & Northern R.R. 1st 7s.	1908	50,000.00	
66,000.00	Walter Baker Co., Ltd., 4½s.	1903	66,000.00	
50,000.00	Chi. Terminal & Transfer Co. 1st 4s.	1947	47,507.50	
120,000.00	Illinois Steel Co., non-conv. 5s.	1913	119,586.25	
43,000.00	Chesapeake & Ohio R.R. 5s.	1939	43,000.00	
100,000.00	Long Island R.R. 4s.	1949	96,137.50	
7,000.00	K. C., Clinton & Springfield R.R. 5s.	1925	6,289.21	
8,500.00	K. C., Mem. & Birmingham R.R. 4s.	1934	8,287.50	
13,000.00	K. C., St. Jo. & Council Bluffs R.R. 7s.	1907	13,000.00	
50,000.00	Kansas City Stock Yards 5s.	1910	50,000.00	
25,000.00	Atchison, Top. & St. Fé R.R. 4s.	1995	25,000.00	
50,000.00	Rio Grande & Western R.R. 4s.	1939	49,180.00	
50,000.00	Oregon R.R. & Navigation Co. 4s.	1946	50,000.00	
50,000.00	Union Pacific R.R. 4s.	1947	50,000.00	
100,000.00	Chic. & W. Michigan R.R. 5s.	1921	100,000.00	
100,000.00	American Tel. & Tel. Co. 4s.	1929	99,875.00	
50,000.00	New England Tel. & Tel. Co. 4s.	1930	50,000.00	
50,000.00	Chi. Junc. & Union S. Yards 4s.	1940	49,250.00	
50,000.00	K. C., Fort Scott & Memphis R.R. 6s.	1928	50,000.00	
25,000.00	Southern Ry., St. Louis Div. 4s.	1951	24,875.00	
25,000.00	Ozark Equipment Co. 5s.	1910	25,000.00	
	Advances to Bond Premium account		44,832.25	
	Bonds			$1,416,920.21
	Amount carried up			$1.666,335.21

	Amount brought up				$1,666,335.21

STOCKS.

Shares.					
172	Boston & Albany R.R.	par	100	34,456.50	
50	Chi., Milwaukee & St. Paul R.R. Pf.	"	100	6,775.00	
12	Cocheco Manufacturing Co.	"	500	6,000.00	
56	Hamilton Woollen Co.	"	100	5,390.00	
31	Great Falls Manufacturing Co.	"	100	3,472.00	
2	Dwight Manufacturing Co.	"	500	1,600.00	
17	Pepperell Manufacturing Co.	"	100	2,789.50	
10	Lowell Bleachery	"	100	975.00	
27	Essex Co.	"	50	3,780.00	
55	Old Boston National Bank	"	100	5,510.50	
15	Merchants' National Bank	"	100	2,220.00	
25	New England National Bank	"	100	3,875.00	
25	Atlantic National Bank	"	100	2,875.00	
25	National Bank of the Republic	"	100	3,625.00	
40	The Molsons Bank, Montreal	"	50	2,930.00	
37	Nat. Mechanics Bank, Baltimore	"	10	706.70	
64	Boston Real Estate Trust	"	1000	68,909.64	
1	Boston Ground Rent Trust	"	1000	900.00	$156,789.84

INVESTMENT OF THE JOY SCHOLARSHIP FUND.

	Massachusetts Hospital Life Insurance Co. .	5,000.00	
	Deposits in Savings Banks	4,123.70	9,123.70

INVESTMENT SWETT SCHOLARSHIP FUND.

	Massachusetts Hospital Life Insurance Co.	10,000.00
	Amount carried up	$1,842,248.75

Amount brought up			$1,842,248.75

REAL ESTATE.

Rogers Building		200,000.00	
Walker "		150,000.00	
Land on Garrison Street	50,840.00		
Workshops " "	30,000.00	80,840.00	
Land on Trinity Place	76,315.69		
Engineering B'ld'g, A, Trinity Place,	90,000.00	166,315.69	
Gymnasium Building		7,967.85	
Engineering Building, B		57,857.10	
Lot No. 2, Trinity Place		137,241.60	
Lot No. 3, " "		259,050.00	
Henry L. Pierce Building, Trinity Place		154,297.05	
Boiler and Power House, " "		26,916.74	
Clarendon St. Land and Building		142,762.94	
Real Estate, Massachusetts Ave., Cambridge		16,154.38	1,399,403.35
Equipment, Engineering Building		16,555.24	
" Workshops		20,628.56	37,183.80

SUNDRIES.

Notes Receivable		137,000.00	
Boston Art Students' Association		9,666.66	
Students' Notes		770.50	
Walker Memorial Fund		1,188.33	
Cash Balance, Sept. 30, 1901		28,638.07	177,263.56
			$3,456,099.46

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

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

William Barton Rogers Memorial Fund		250,225.00	
Richard Perkins Fund		50,000.00	
George Bucknam Dorr Fund		49,573.47	
Martha Ann Edwards "		30,000.00	
Nathaniel C. Nash "		10,000.00	
Sidney Bartlett "		10,000.00	
Robert E. Rogers "		7,680.77	
Albion K. P. Welch "		5,000.00	
Stanton Blake "		5,000.00	
McGregor "		2,500.00	
Katharine B. Lowell "		5,000.00	
Samuel E. Sawyer "		4,764.40	
John W. and Belinda Randall Fund		83,452.36	
James Fund		163,654.21	676,850.21
Amount carried up			$676,850.21

Amount brought up		$676,850.21
The income of the following is used towards paying salaries: —		
Nathaniel Thayer, for Professorship of Physics .	25,000.00	
Jas. Hayward, for Professorship of Engineering	18,800.00	
William P. Mason, " " Geology . .	18,800.00	
Henry B. Rogers, for general salaries	25,000.00	
George A. Gardner, " "	20,000.00	
Sarah H. Forbes, "	500.00	108,100.00
SCHOLARSHIP TRUSTS.		
Richard Perkins Fund	53,238.21	
James Savage "	13,978.72	
Susan H. Swett "	10,182.95	
William Barton Rogers Fund	10,666.24	
Joy Fund	9,123.70	
Elisha Thatcher Loring Fund	5,342.57	
Charles Lewis Flint "	5,264.09	
Thomas Sherwin "	5,000.00	
Farnsworth "	5,000.00	
James H. Mirrlees "	2,815.67	
William F. Huntington "	5,216.66	
T. Sterry Hunt "	3,225.32	
Elisha Atkins "	5,000.00	
Nichols "	5,000.00	
Ann White Vose "	60,748.22	
Ann White Dickinson "	40,618.19	
Dalton Grad. Chemical "	6,222.54	
Willard B. Perkins "	6,839.18	
Billings Student "	50,000.00	
Henry Saltonstall "	10,000.00	313,482.26
OTHER TRUSTS.		
Charlotte Billings Richardson Ind. Chem. Fund		37,378.78
Susan Upham Fund		1,297.64
Susan E. Dorr "		11,000.00
William Hall Kerr Library Fund		2,000.00
Charles Lewis Flint " "		5,000.00
Rotch Architectural " "		5,000.00
Rotch Architectural Fund		25,000.00
Rotch Prize "		5,200.00
Rotch "Special" Prize Fund		5,200.00
Edward Austin "		365,034.09
Teachers' "		103,800.00
Saltonstall "		40,200.00
MISCELLANEOUS.		
Students' Deposits	200.00	
Henry L. Pierce Legacy, 1898	800,000.00	
Robert C. Billings Legacy, 1900	92,500.00	
Rebecca A. Goddard " 1901	1,000.00	
Barthold Schlesinger " 1901	2,000.00	
Electrical Engineering Building Fund	10,000.00	
M. I. T. Stock Account	845,856.48	1,751,556.48
		$3,456,099.46

Comparative Statement of Funds, etc.

	Sept. 29, 1900.	Sept. 30, 1901.
Trusts for general purposes	676,696.68	676,850.21
" " Salaries	107,600.00	108,100.00
" " Scholarships	252,808.90	313,482.26
" " Library	7,000.00	7,000.00
Charlotte B. Richardson Ind. Chem. Fund	37,378.78	37,378.78
Susan Upham Fund	1,297.64	1,297.64
Susan E. Dorr "	9,526.92	11,000.00
Rotch Architectural Library Fund	5,000.00	5,000.00
Rotch Architectural Fund	25,000.00	25,000.00
Rotch Prize Fund	5,200.00	5,200.00
Rotch "Special" Prize Fund	5,200.00	5,200.00
John Foster Legacy	10,000.00	
Henry L. Pierce Legacy	795,000.00	800,000.00
John W. Carter "	6,250.00	
Robert C. Billings "	92,500.00	92,500.00
Saltonstall Fund		40,200.00
Electrical Engineering Building Fund		10,000.00
Rebecca A. Goddard Legacy		1,000.00
Barthold Schlesinger "		2,000.00
Edward Austin Fund	341,215.64	365,034.09
Teachers' Fund	101,000.00	103,800.00
Letter Box Fund	51.12	
Students' Deposits	200.00	200.00
Notes Payable	20,000.00	
M. I. T. Stock Account	840,515.74	845,856.48
	$3,339,441.42	$3,456,099.46
Increase,		
Consisting of:		
Bequests for Special Purposes, etc. (See page 4)	99,808.46	
Gifts and Bequests for General Purposes. (See page 4)	48,000.00	147,808.46
Less Funds of 1900, used	241.16	
" Expenses more than Income	9,590.26	
" Loss on Sale of House 34 Commonwealth Ave	1,319.00	
" Notes Payable, paid	20,000.00	31,150.42
		$116,658.04

INCOME FROM GENERAL INVESTMENTS, AND APPLICATION THEREOF.

Applied to Salaries	4,314.00	From Dividends, Bank Stocks	1,009.40
" " Scholarships	10,110.96	" State Tax returned on Bank Stocks	258.81
" " " James Savage Fund	400.00	" Bonds	59,689.63
" " Charlotte B. Richardson Fund	1,495.15	" Dividends, Railroad Stocks	1,852.50
" " Teachers' Fund	4,000.00	" " Manufacturing Stocks	1,048.00
" " Edward Austin Fund	14.400 00	" Real Estate Stocks	2,915.00
" " Rotch Prize Funds	400.00		
" " Rotch Architectural Fund	1,000.00		
" " Library	480.00		
" " General Purposes	24,707.20		
" " Samuel Dorr Annuity	1.000.00		
" " Increase of Funds	881.03		
" " Advances to Bond Premiums	3.585.00		
	$66,773.34		$66,773.34

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

Paid Massachusetts Institute of Technology	10,853.00	Received Income from Railroad Bonds	11,663.00
Credited to Advances Bond Premiums	810.00		
	$11,663.00		$11,663.00

DETAILS OF SOME ITEMS IN TREASURER'S CASH ACCOUNT.

Rents.

Huntington Hall, for Lowell Lectures	3,500.00	
Lowell School of Design	1,800.00	
Land and Building, Clarendon St., on account	2,500.00	
Use of Rooms and Gymnasium	932.90	
	8,732.90	
Less Tax and Repairs, Cambridge, net	2.97	$8,729.93

Department Supplies.

Chemistry	11,361.72	
Physics	7,595.58	
Mechanical Engineering	4,854.11	
Architecture	3,892.71	
Mining	3,451.59	
Civil Engineering	2,538.58	
Workshops	2,208.68	
Periodicals	1,920.00	
Applied Mechanics	1,328.09	
Biology	1,268.80	
English	1,195.47	
Geology	1,021.11	
Naval Architecture	684.09	
Modern Languages	322.97	
Military	240.89	
Mathematics	203.25	
Drawing	168.36	44,256.00

Salaries.

Instruction	209,191.14	
Administration	25,898.43	
Labor	27,920.25	$263,009.82

General Expense.

Telephone Service, Installing Stations, Rentals, Repairs, etc.		3,023.85	
Postage		3,000.08	
Sundries		2,973.14	
Stationery and Office Supplies		1,494.57	
Electrical Wiring, Lamps, etc.		1,250.04	
Furniture and Window Shades		1,111.23	
Janitors' Supplies		1,002.69	
Examinations		985.07	
Express		700.91	
Diplomas and Commissions		598.10	
Washing		562.51	
Engine Room Supplies:			
Oil	275.39		
Sundries	58.36		
Waste	55.25	389.00	
Library		292.26	
Ice		275.47	
Legal Fees		252.50	
Taxes' Sale, No. 34 Commonwealth Avenue		224.69	
Examination Books		201.16	
Graduation Exercises		191.30	
Gymnasium		184.20	
Glass		182.40	
Removing Ashes		131.30	
Lowell School of Design		125.44	
Street Watering		104.64	
U. S. Vaults		75.00	$19,331.55

Repairs.

Department Improvements:			
Physics		626.80	
Chemistry		468.84	
Mechanical Engineering		375.98	
Mining		286.24	
Workshops		273.18	
Civil Engineering		231.97	
Architecture		219.96	
Drawing		207.78	
English		135.11	
Naval Architecture		97.17	
Geology		60.10	
Biology		50.63	
Applied Mechanics		17.18	
Modern Languages		6.25	
Mathematics		3.88	3,061.07
Rogers Building			1,897.83
Walker "			1,171.18
Sundries			1,065.47
Engineering Building			758.52
Steam Fitting			727.50
Pierce Building			391.85
Gymnasium			202.67
Boiler and Power House			105.19
			$9,381.28

BOSTON, November 29, 1901.

Mr. E. L. Parker, an accountant employed by this committee, has examined the accounts of the Treasurer of the MASSACHUSETTS INSTITUTE OF TECHNOLOGY for the year ending September 30, 1901, and his report is hereto annexed.

We have verified the list of personal property held by the Institute.

CHARLES C. JACKSON,
JAMES P. TOLMAN,
WILLIAM L. PUTNAM,
Members of the Auditing Committee.

BOSTON, November 29, 1901.

To the Auditing Committee of the
Massachusetts Institute of Technology:

GENTLEMEN: I have audited the accounts of Mr. George Wigglesworth, Treasurer, for the year ending September 30, 1901.

They are correct, payments duly vouched and the receipts from students' fees and all other income duly accounted for. The cash at office and in banks, according to the deposit books, is correct. The account of property held by the Institute and the funds and balances, as shown in the Treasurer's report of September 30, 1901, is in accordance with the books.

Respectfully submitted,

EDWARD L. PARKER,
Public Accountant.