VOL. XXXII, No. 28 March 30, 1923

YALE ALUMNI WEEKLY

PIERSON 1701
ANDREW 1707
CUTLER 1719
WILLIAMS 1726
CLAP 1740
DAGGETT 1766
STILES 1778
DWIGHT 1795
DAY 1817
WOOLSEY 1846
PORTER 1871
DWIGHT 1886
HADLEY 1899
ANGELL 1921

The Dedication of the Sterling Laboratory

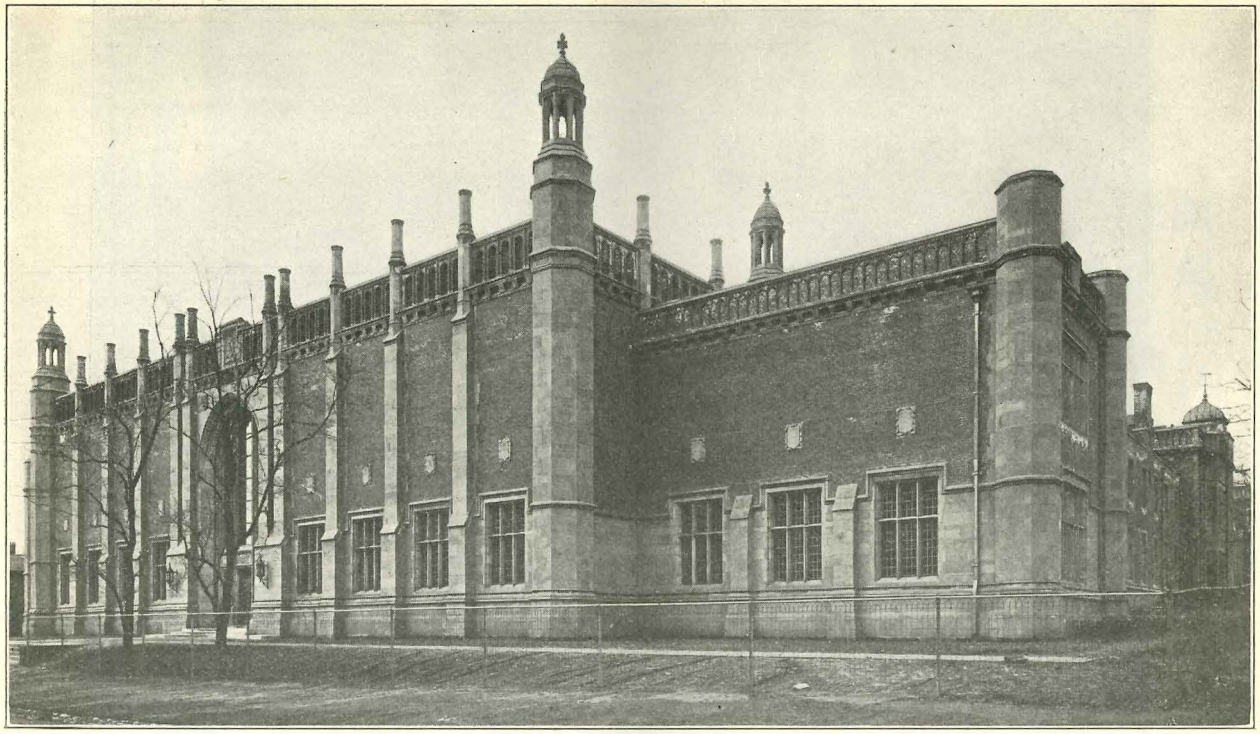
Meeting of American Chemical Society Next Week in Connection with the Ceremonies at Yale's Great Chemistry Laboratory Will Make Event of National Importance

Football Tickets

Committee Announces Plans for the Distribution of Seats for the Big Games Next Fall

Office 120 High Street, New Haven, Connecticut

$4.00 a Year 10 cts. a Copy



THE STERLING CHEMISTRY LABORATORY

The south facade, with its imposing entrance and full height, is directly opposite the Sloane Physics Laboratory

Program

American Chemical Society Meeting and Dedication of Sterling Laboratory

MONDAY, APRIL 2

10:00 A. M.—REGISTRATION OPENS, BYERS HALL.

2:30 P. M.—COUNCIL MEETING, BYERS HALL.

6:45 P. M.—COUNCILORS' DINNER, HOTEL TAFT.

Speakers at the Dinner

President Charles M. Walker, Chamber of Commerce, Toastmaster.
E. C. Franklin, President, American Chemical Society.
James Rowland Angell, President, Yale University.
A. A. Fries, Brigadier-General, Chemical Warfare Service.
Arthur D. Little, Consulting Chemist, Boston, Mass.

TUESDAY, APRIL 3

10:30 A. M.—GENERAL MEETING, WOOLSEY HALL.

Addresses of Welcome

Hiram Bingham, '98, Lieutenant Governor of Connecticut.
David E. FitzGerald, '95 L., Mayor of New Haven.
President Angell.

Response

President Franklin, American Chemical Society.

General Address

Francis P. Garvin, '97, "Chemistry and the Public."

1:00 P. M.—LUNCHEON, UNIVERSITY DINING HALL.

2:00 P. M.—GENERAL SCIENTIFIC MEETING, WOOLSEY HALL.

Six addresses on scientific topics of general interest.

8:00 P. M.—SMOKER.

WEDNESDAY, APRIL 4

11:00 A. M.—DEDICATION OF THE STERLING CHEMISTRY LABORATORY.

Presentation of the Keys
Mr. George H. Church
Representing the Sterling Trustees

Acceptance for the University
Greeting to the American Chemical Society
President Angell

Reply on behalf of the Society
President Franklin

Address
"The History of Chemistry in America, with Special Reference to Yale"
Edgar Fahs Smith

1:00 P. M.—LUNCHEON, UNIVERSITY DINING HALL, FOLLOWED BY SHORT ADDRESSES OF GREETING FROM THE UNIVERSITY'S FOREIGN GUESTS.

2:00 P. M.—INSPECTION OF THE LABORATORY.

4:00–6:00 P. M.—INFORMAL TEA, STERLING LABORATORY.

6:00 P. M.—CHARLES GOODYEAR MEMORIAL DINNER.

8:30 P. M.—PUBLIC MEETING, WOOLSEY HALL.

Address by Sir J. J. Thomson, F.R.S.

THURSDAY, APRIL 5

9:30 A. M. & 2:30 P. M.—SECTIONAL AND DIVISIONAL MEETINGS.

4:30 P. M.—MEETING OF CHAIRMEN AND SECRETARIES OF LOCAL SECTIONS.

5:30 P. M.—FRATERNITY AND ALUMNI DINNERS.

8:30 P. M.—INDOOR POLO GAME, YALE ARMORY.

FRIDAY, APRIL 6

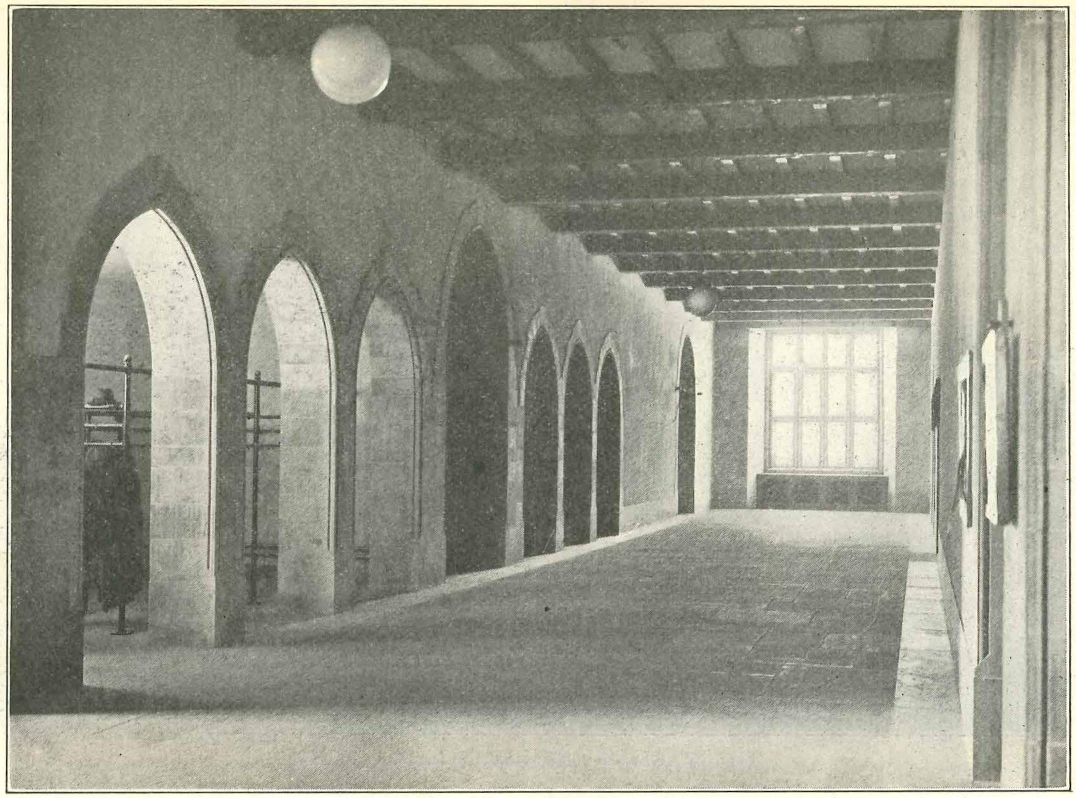
9:30 A. M. & 2:00 P. M.—SECTIONAL AND DIVISION MEETINGS.

1:00 P. M.—LUNCHEON FOR LADIES, LAWN CLUB.

8:30 P. M.—RECEPTION, WOOLSEY HALL.

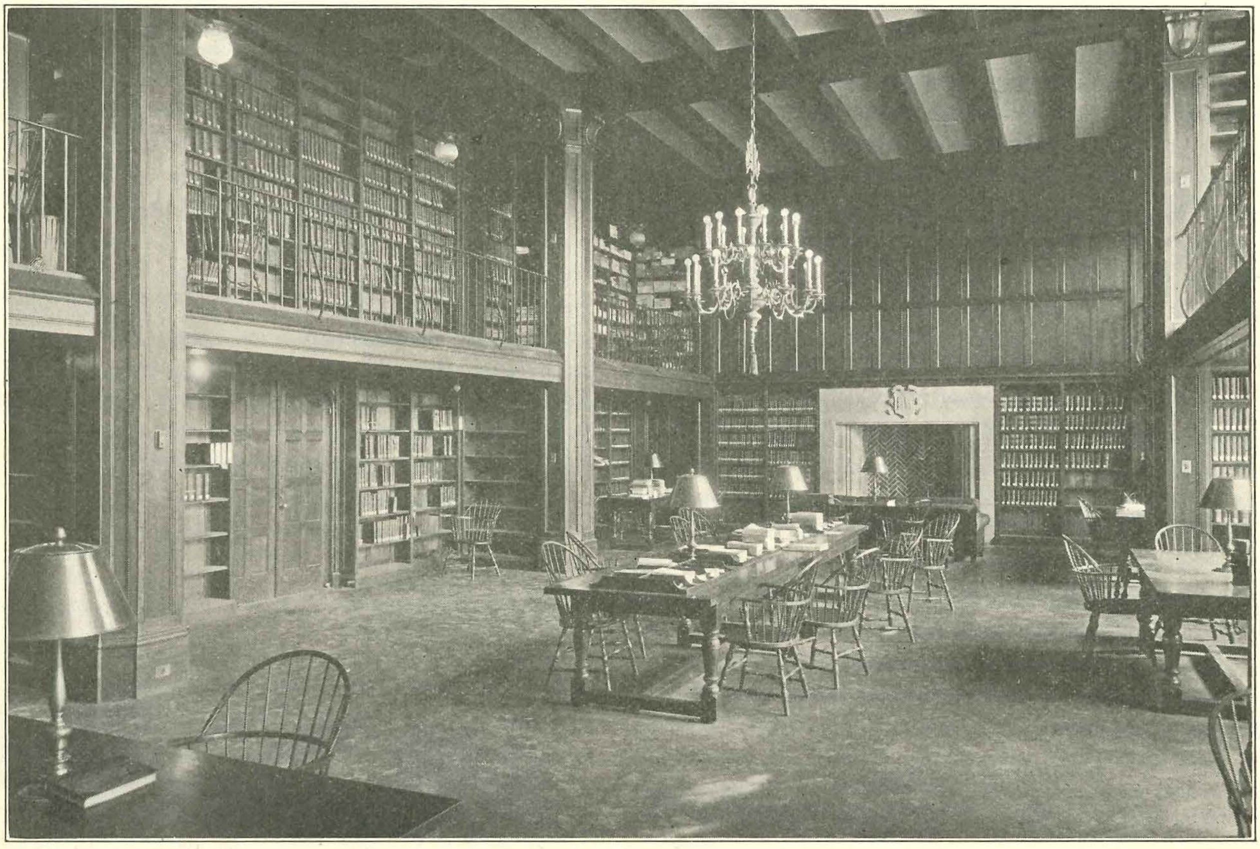
SATURDAY, APRIL 7

8:00 A. M.—VISITS TO INDUSTRIAL PLANTS IN AND NEAR NEW HAVEN.



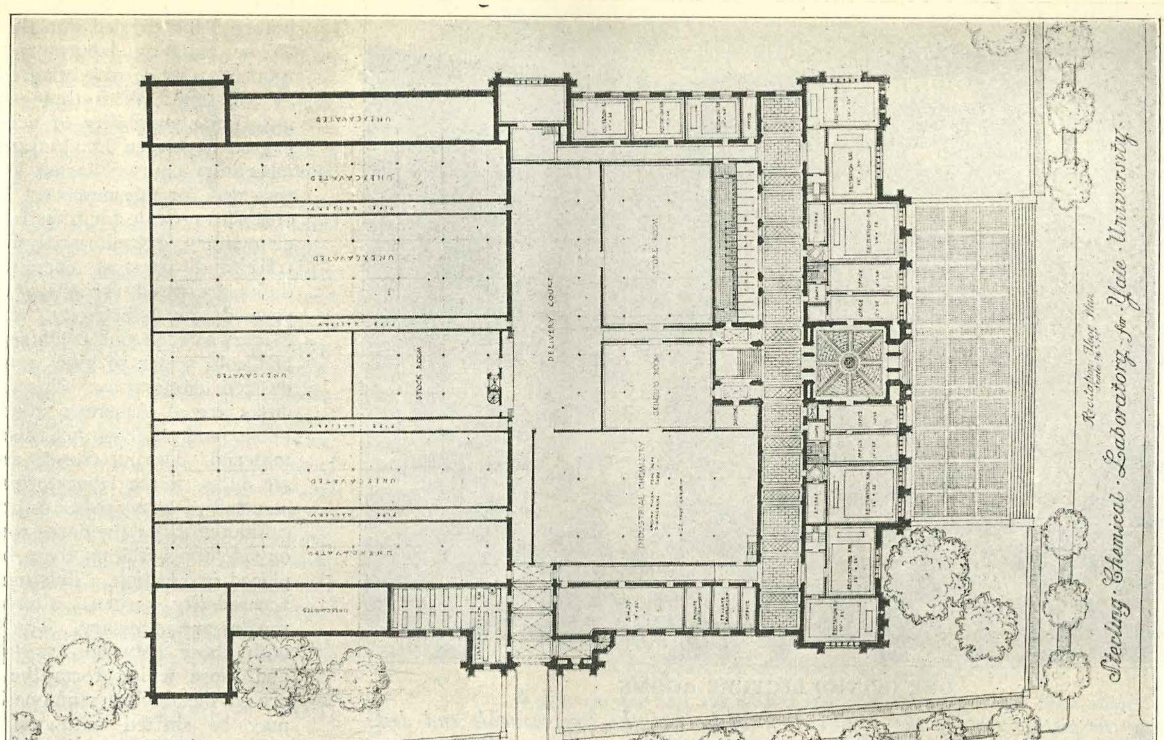
ONE OF THE LONG HALLS

These corridors, on the ground and main floors, extend the width of the building, and separate the class and lecture rooms from the laboratory departments



THE LIBRARY

In this room are kept text and reference books and technical journals of chemistry



THE "GROUND FLOOR" OF THE LABORATORY

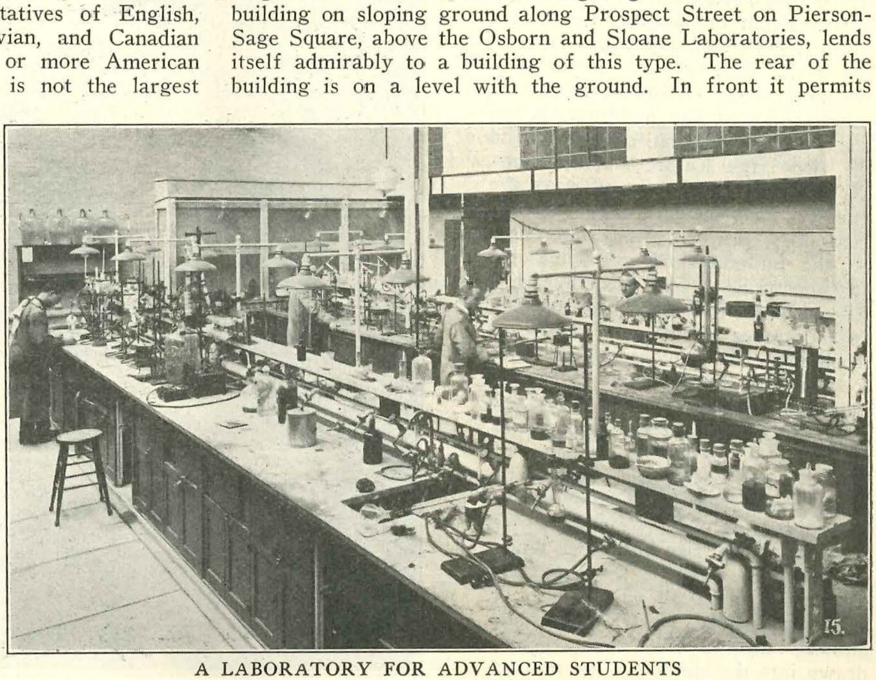
Showing the unexcavated portion to the rear. The main floor, containing the teaching laboratories beyond the lecture and recreation rooms, becomes the second story in front while still the ground floor in back, because of the sloping ground

A Description of the Sterling Laboratory

THE dedication of the Sterling Chemistry Laboratory on Wednesday of this week—the one hundred and nineteenth anniversary of the first lecture on chemistry at Yale, given by Benjamin Silliman—during the sixty-fifth meeting of the American Chemical Society was an educational event of international importance attended by representatives of English, Scotch, French, Dutch, Italian, Scandinavian, and Canadian universities and by some fifteen hundred or more American chemists. While the Sterling Laboratory is not the largest laboratory for chemistry in the United States, it is the largest single unit devoted to chemical purposes that has ever been constructed. The term "unit" is used advisedly because most large laboratories are a more or less heterogeneous collection of independent laboratories housed in a single building.

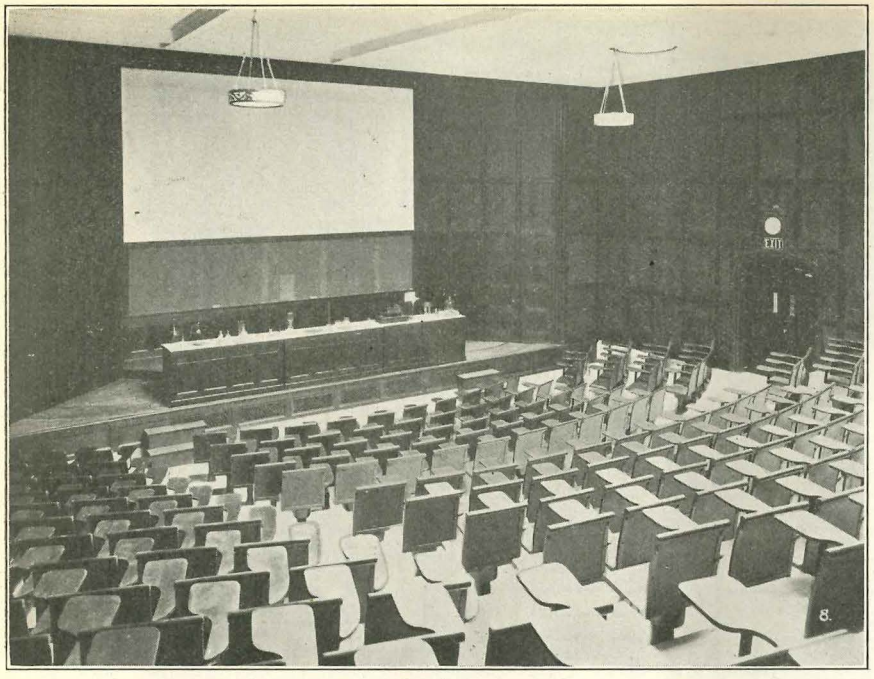
A few figures will give some idea of the size of the structure. The maximum length is 328 feet, the maximum width 256 feet, and total finished floor area is 167,580 square feet. There are twelve classrooms with a total seating capacity of 630. Each is provided with a demonstration table for conducting illustrative experiments. The total laboratory capacity for undergraduate students is 900 at one time.

The laboratory may be divided for purposes of description into three parts, two of which constitute the outside of the building. The classroom section, in front, is of dignified and handsome appearance. Along the sides of the building are two long, high, narrow sections known as the "architectural screens." Within the court formed by these two parts is the laboratory section on a single level and with overhead lighting. The location of the building on sloping ground along Prospect Street on Pierson-Sage Square, above the Osborn and Sloane Laboratories, lends itself admirably to a building of this type. The rear of the building is on a level with the ground. In front it permits



A LABORATORY FOR ADVANCED STUDENTS

Eight men can work here with every modern apparatus at their disposal



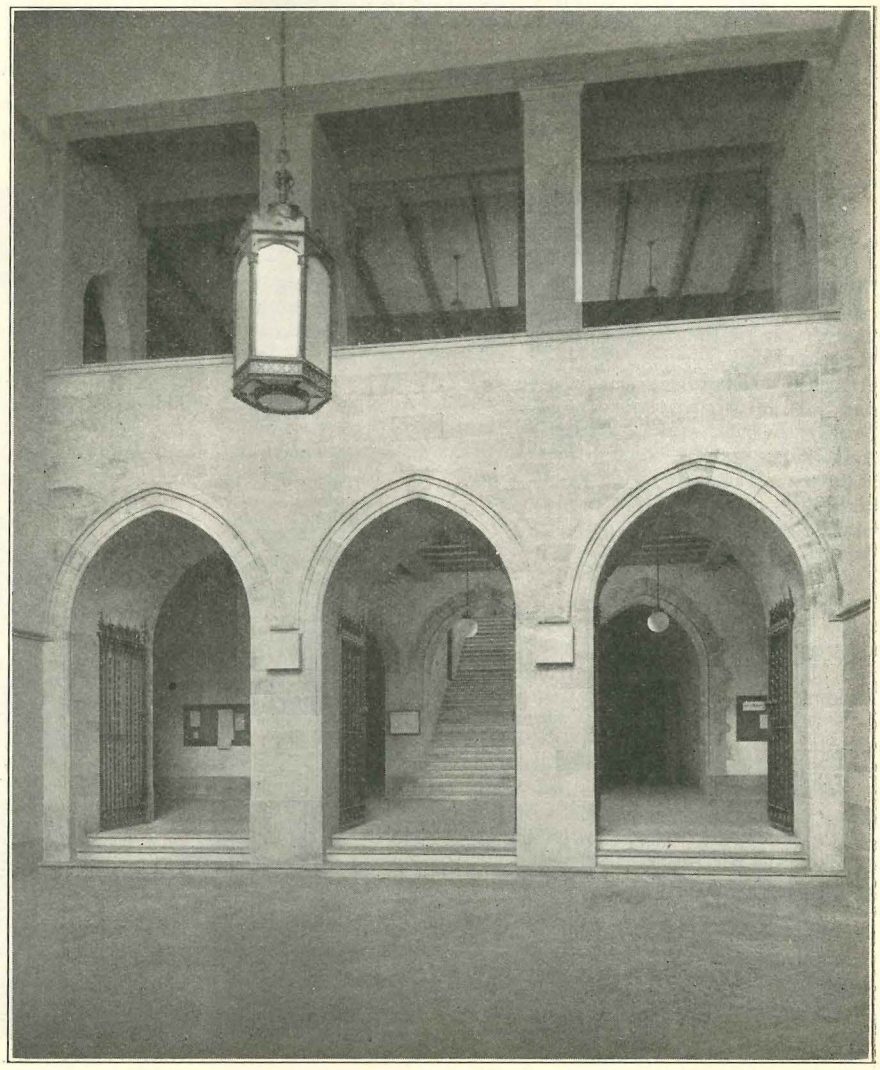
ONE OF THE LECTURE ROOMS

Showing the picture screen, the fixed central desk, and the two movable end desks which roll on tracks

below it another story of approximately half the floor space of the main floor and of full height. None of the building proper is in any sense a basement.

Entering through a great arched doorway into the building, one comes into an imposing lobby, floored and walled with stone, and bearing in the ceiling massive, rough-hewn beams. This leads into a hallway which extends for two hundred and fifty feet across the building. Opening into it are classrooms, the main office of the laboratory, and the entrances to the shops, stock rooms, and delivery court. From the hallway there rises a broad stone stairway which leads to the main floor above. Here is a similar hallway extending from east to west across the building. Along one side of it are small classrooms and the two large lecture amphitheaters. On the other side are the offices of the Faculty and the entrances to the laboratory proper. Along the sides of the building and occupying the "architectural screen" section are a large number of small laboratories. In the center of the west section is the library. Within the central court, a space two hundred and fifty feet long and one hundred and eighty feet wide, are all the teaching laboratories, divided by partitions which are entirely non-structural. Below the laboratory section is a shallow chamber known as the "plenum" space, through which rise the steel pillars on which the floor is supported and into which come all water, gas, air, and steam lines, electrical conduits, and all drains. The air which is drawn into the building from the outside over tempering coils passes first into this chamber, where it is allowed to mix and attain uniform temperature before being carried into the building.

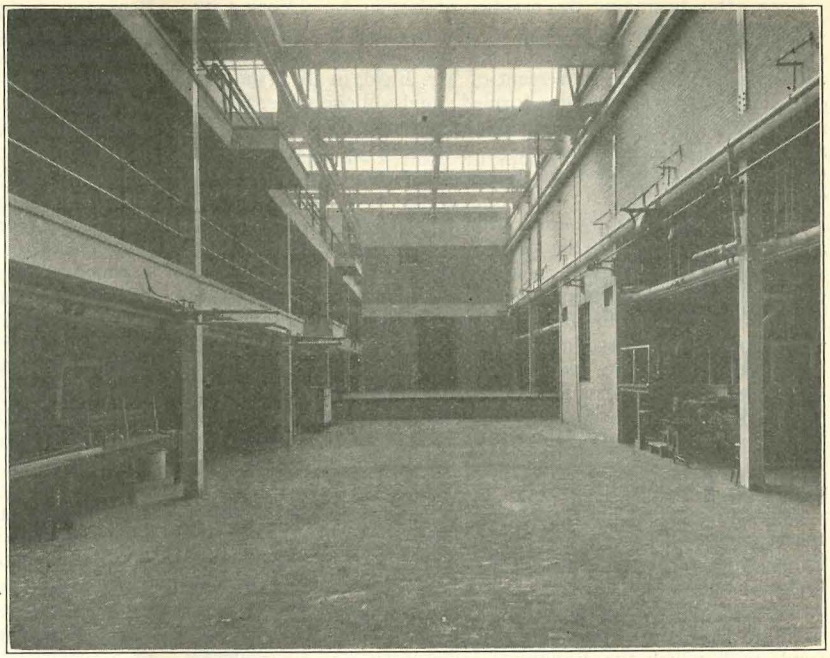
The teaching laboratories have a total capacity of nine hundred students at one time. With three shifts, this means the possibility of accommodating twenty-seven hundred students in laboratory courses, locker space being provided for this number. These laboratories provide facilities for teaching elementary, organic, analytical, industrial and physical chemistry. The desks are fitted for gas, water, compressed air, electricity, and steam. Mixers at each sink combine the steam and cold water to give water of any desired temperature. The tops of the desks are of Alberene stone, and the hoods and shelves are also of this material. Drying closets and all the air ducts of the laboratories are constructed of heavy asbestos board. The cabinet work of the desks was all done outside the building, these being later placed in position. This means ready accessibility when alterations or repairs are necessary. The partitions, both those between the laboratories and those which form the hallways, are of the thickness of one brick, and may be shifted with the minimum expense and inconvenience. This is a



THE ENTRANCE FOYER

Class rooms and offices extend on either side, with the main stairway straight ahead

distinctive feature of the building, the extreme flexibility of the various laboratories insuring a long period of usefulness in caring for a rapidly changing and progressing science. The saw-tooth roof above the laboratory section is carried on iron pillars twelve feet high, and has a maximum height of twenty feet. The skylights are set nearly vertical and on the north side of the roof. This means that in summer the sun never shines directly into the laboratories. The spaces in the room seem to function as heat insulators, keeping the rooms warm in winter and cool in summer. In the center of the laboratory section is a stock room which functions as a retail store, being supplied by large storage rooms for apparatus and chemicals on the floor below. The laboratories are all on a single level with the exception of the space devoted to chemical engineering. This portion of the laboratory is one hundred feet long, fifty feet wide, and extends from the first floor level up through the main floor and is under the same roof as the remainder of the laboratories. In addition to factory size apparatus, it has two galleries and a traveling crane, and is equipped with shafting, piping, and wiring of industrial dimensions.



THE CHEMICAL ENGINEERING LABORATORY

It was within this room that the dedication exercises were held

Besides eleven classrooms with a seating capacity of about seven hundred, there are two large lecture rooms, one of which will accommodate 150 persons and the other three hundred. Back of the platform of the smaller lecture room is a well-equipped storage and preparation room. Here experiments for classroom demonstration are gotten ready on desks which may be rolled on tracks into either lecture room. These movable desks fit against the permanent lecture desk in the center of the platform. A down-draft register on the desk carries away any fumes that may be evolved, and back of the desk is a small iron door communicating with a fume closet, so that in case an experiment goes wrong it may be transferred to where it can do no harm. The lecture room walls are of flooring cork stained and paneled in dark oak. The artificial lighting is of the indirect type, flooding the room with soft light, while skylights equipped with shutters admit daylight. The floor slopes up at the proper angle to give a good view of the lecture desk from every seat. Spot lights are arranged to play upon the surface of the desk, focusing the attention of the student on the demonstration. The acoustic properties of these lecture rooms are remarkably good, the lowest tones being audible in the most remote corners. The lecture rooms are fitted with projection lanterns and motion picture apparatus.

A striking feature of the building is the space devoted to graduate work and especially to advanced chemical research. Provision has been made for one hundred and twenty research workers, most of them in small laboratories arranged for two students. These small laboratories are located in the "architectural screens" along the side of the laboratory, have outside light, and are specially equipped for original investigations. These laboratories are isolated units where the workers may be free from the distractions of the teaching laboratories, and at the same time are conveniently located with reference to the library and supply room.

The library is a spacious and cheerful room, finished and furnished in dark oak, with carved decorations of the same nature as those on the outside of the building, and with a massive fireplace. All the text books, reference books, and bound files of chemical journals are collected in this room, these being partially duplicated in the main university library.

The third floor of the "architectural screens" is intended for dormitory rooms, and on the west side these are finished and occupied by graduate students and instructors. The social life of the building is cared for by a large "common room" and a well-equipped kitchen.

The Sterling Laboratory is constructed of pressed red brick and Longmeadow brown sandstone, in the Collegiate Gothic style. Its decorations are significant of chemistry. Above the main entrance is a great shield of Yale University guarded by symbolic figures. On either side of this are the seals of the State of Connecticut and of New Haven Colony. On the front of the building are found tablets bearing the eight alchemistic symbols with their modern interpretations. Beyond these are other tablets inscribed with the names of the greatest chemists of all time. Among them is J. Willard Gibbs. for many years professor in Yale, whose origination of the "Phase Rule" has given his name scientific immortality. Across the front of the building are tiny tablets bearing the atomic numbers of the known elements. Along the sides of the building are carvings showing chemical formulae, symbolic representations of fire, electricity, light, and power, familiar chemical apparatus, interspersed with whimsical designs such as bulldogs, owls, and grotesque faces.

The Dedication

Presentation of the Keys

BY MR. GEORGE H. CHURCH

REPRESENTING THE STERLING TRUSTEES

AS one of the Trustees under the will of the late Mr. John W. Sterling, I have the honor of acting on their behalf in the dedication of this building, constructed and equipped with funds furnished from Mr. Sterling's Estate and named in his honor Sterling Chemistry Laboratory.

Those of you who were personally acquainted with Mr. Sterling will recall his many admirable qualities. I may be permitted to refer to a few of the leading events in his active and busy career. He was graduated from Yale in 1864, valedictorian of his Class and a Townsend Prize winner. He took a post-graduate course, principally under Professor, afterwards President, Porter, and received his LL.B. degree from Columbia Law School in 1867. In 1893 Yale conferred upon him the honorary degree of LL.D.

Soon after beginning the practice of law in New York City, Mr. Sterling became a partner of the late David Dudley Field and Thomas G. Shearman, composing the firm of Field & Shearman. Upon the retirement of Mr. Field, in 1873, the firm of Shearman & Sterling was formed; and although Mr. Shearman died in 1900, the firm name was continued by Mr. Sterling, and since his death it has been continued by Mr. John A. Garver, Yale 1875, who for many years was a partner with them.

For more than thirty years prior to his death, I was closely associated with Mr. Sterling and his firm in the conduct of their trust and other matters of an accounting nature, and I was in a position to observe the single-mindedness with which he applied his untiring energy, his business sagacity, and his great experience to the interests of his clients. His foremost thought in connection with every matter committed to his care or with which he had any association was service: the best service that he could render with the assistance that was available to him. He gained easily and completely the absolute confidence and trust of all who came in contact with him, no matter how exalted or how humble.

There were two objects to which he was especially devoted: the Miriam Osborn Memorial Home and Yale University. The Home was established under the will of Mrs. Miriam A. Osborn, widow of Charles J. Osborn, who in her lifetime (doubtless at the suggestion of Mr. Sterling) donated Osborn Hall to Yale, in memory of her husband, and also provided funds with which the Biological Laboratory was subsequently built. Mr. Sterling was the active executor of Mrs. Osborn's estate and devoted much time and attention to the establishment and operation of the Home at Harrison, New York, for the benefit of needy gentlewomen who may there pass the remaining years of their lives among comfortable and attractive surroundings; and he personally added very largely to the generous fund provided by Mrs. Osborn. But Mr. Sterling's main objective and the inspiring incentive of a lifetime was his Alma Mater. That steady devotion never faltered. He never married and the wills which he made at various times always left the great bulk of his fortune to Yale, for the erection and maintenance of buildings and the creation of professorships and scholarships. Already ten professorships have been endowed, this building has been completed, the Sterling Hall of Medicine is now in course of erection, and a library building is contemplated, which it is hoped to make the crowning achievement of Mr. Sterling's benefactions and the enduring testimonial to his love for Yale.

Therefore, in partial execution of this great trust, I now, on behalf of Mr. Sterling's Trustees and in his name, present this Chemistry Laboratory to Yale University, assured of the great benefit that it will prove to this and succeeding generations.

Acceptance for the University

BY PRESIDENT JAMES ROWLAND ANGELL

ON behalf of Yale University, I gratefully accept this superb monument to the love and devotion which John W. Sterling bore his alma mater. On this spot generation after generation of eager youth will be taught to recognize, obey, and direct to man's needs the fundamental laws of nature. Here the ablest minds will delve continually into nature's secrets, unlocking her treasures for the increasing happiness of all mankind. Industry and art, agriculture and commerce, medicine and engineering, will be the constant beneficiaries of the labor here expended. And best perhaps of all will be the ever more penetrating insight into the marvellous composition of the great universe in which we live.

In every contribution which is here made to learning and to human welfare, Mr. Sterling will have a share and to him and to you, Sir, the representative of his faithful Trustees, under whose careful guidance this great gift has been administered, we record our enduring gratitude.

Early Days of Yale Chemistry

It seems fitting on this occasion to call to mind, however briefly, a few of the men to whom the University is most conspicuously indebted for the development of chemistry. The history of this science at Yale began 119 years ago to-day when Benjamin Silliman, responding to an invitation of President Dwight, gave on April 4, 1804, his first lecture on Chemistry in a building since destroyed, which stood on the South side of Chapel Street. In 1853 he became Professor-emeritus, and in the intervening period not only established firmly the interests of Chemistry as a subject of academic instruction, but also in 1818 founded the *American Journal of Science*, which is still conducted by his grandson, Professor Edward S. Dana. He furthermore succeeded at an early date in gaining academic recognition for Mineralogy and Geology and was actively instrumental in the founding of the Sheffield Scientific School.

Among his students and assistants were his son Benjamin Silliman, Jr., who subsequently succeeded to the Professorship of General and Applied Chemistry, John P. Norton, later Professor of Agricultural Chemistry in the Sheffield Scientific School, Professor George F. Barker, afterward at the University of Pennsylvania, and Oliver T. Hubbard, subsequently Professor at Dartmouth College.

In 1856 Samuel W. Johnson was appointed Professor of Analytical and Agricultural Chemistry and served for forty years. Through his efforts the Connecticut State Agricultural Experiment Station, of which he was made Director, was established in 1877, and, this being the first institution of its character, he thus became the founder of the great movement which has since spread all over the country affecting the national practice of agriculture in the most fundamental way. Not only through his own contributions, but through the training of a remarkable group of distinguished students, among whom mention may be made of Chittenden, Jenkins, Atwater, and Osborne, he left enduring contributions to agricultural and physiological chemistry.

Few men in American science have achieved a more eminent position than J. Willard Gibbs, who was Professor for thirty-two years in Yale, having been appointed Professor of Mathematical Physics in 1871. His fundamental contribution to the formulation of the principle of chemical equilibrium is recognized to-day as one of the great outstanding achievements of modern chemical theory.

The continuing work of Russell H. Chittenden is so fresh in the minds of all who are here gathered that it is needless to enlarge upon it, but it is simple justice to say that physiological chemistry in the United States owes more to him than to any other man and he has shown himself a worthy successor of the great group of chemists who have preceded him at Yale.

There are many other men whose names might well be added to this list of contributors to the development of Chemistry in the University, but we must content ourselves with these few instances.

It is surely appropriate that we should on this occasion recognize also those who have provided the buildings and the resources wherewith our chemists have done their work. In the early years chemistry led a nomadic existence, having apparently been originally conducted by Professor Silliman in a kind of dug-out in one of the old College buildings, and afterward the basement of the President's house appears to have been devoted to the advanced work in this somewhat submerged subject. Later, use was made of the old Commons building.

Shortly after the establishment of the Sheffield Scientific School, a considerable part of the chemical work was moved into the old medical building, now the headquarters for the administration of the Sheffield Scientific School, and in 1895 there was completed the Sheffield Chemical Laboratory, built by the contributions of several donors. In 1886 Albert E. Kent, of the Class of 1853, appreciating the fundamental significance of chemistry for the modern world and desiring that the students of Yale College enjoy to the full the benefits of contact with this great field of knowledge, erected the commodious building which bears his name, at the corner of Library and High Streets where, until the present year, the chemical work of Yale College has been carried forward. In 1901-2 he made an additional contribution and in 1906 his son, William Kent, of the Class of 1887, responding to the needs for additional space, generously gave the necessary funds for improvements and for the adding of another floor to this building, thus completing the original plan. Professor Frank A. Gooch had been appointed in 1885 to have charge of the College Department of Chemistry.

The remarkable increase of interest in Chemistry and the greatly augmented number of students, not only undergraduates, but graduates and members of the professional schools, desiring to pursue chemical studies, led to the request of the Corporation to the Trustees of the estate of John W. Sterling to consider the erection of a University Laboratory of Chemistry, and the great building in which we are now gathered is the outcome of this request. May those who labor in it be worthy of the great ideals which animated the founders of their science, and of the noble men who have preceded them in its development here at Yale.

To the A. C. S.

And now, Dr. Franklin, it is my privilege and pleasure to turn over to you as President of the American Chemical Society the use of this beautiful structure for your purposes during the week we are so fortunate as to have you with us. The University puts itself at your disposal and trusts that you may find agreeable the various arrangements provided for your convenience.

[President E. C. Franklin, responding for the American Chemical Society, expressed the gratitude of that body for the University's hospitality, and accepted the laboratory for use during the meeting.]

The History of Chemistry in America, with Special Reference to Yale

BY EDGAR FAHS SMITH
FORMER PROVOST, UNIVERSITY OF PENNSYLVANIA

I AM indeed grateful for the opportunity of speaking to you on the History of Chemistry in America, with reference to Yale. This is an epochal occasion, and while we rejoice in the possession of this magnificent, palatial edifice, designed for the service of chemistry, it is well, in this moment of exultation, to take a backward look and note the "rock from whence we were hewed and the hole of the pit from whence we were digged." So that, with your permission, I shall briefly touch upon facts "pick'd from the worm holes of long vanish'd days and from the dust of old oblivion rak'd."

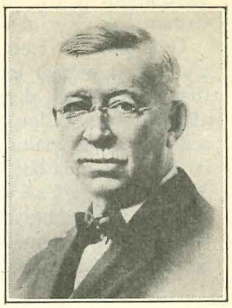
Chemists—American chemists—in tracing the history of their science, are apt to turn to other countries. For chemistry was born in the dawn of civilization and to older lands one looks for its gradual evolution. As the oldest of the experimental sciences it is co-existent with man's own rise and development. One need not search far to find evidences of its presence. Yet Americans have frankly admitted their ignorance of the earliest days of chemistry in this western world. In fact, it has only been within the last quarter of a century that any effort has been put forth to ascertain when chemistry had its beginnings among us and what contributions it has made to the upbuilding of society.

The Beginnings in this Country

It is to Jamestown, Virginia, founded in 1607, that the student of the history of chemistry must go, for there in the year 1608, before the "ring of the axe was heard in the forests of America," bold spirits erected a glass house "in the woods" producing a product which was sent home, in crude form, but still proof of the possibilities of an industry which might contribute to the maintenance of the settlement and to the coffers of the mother land. Glass beads, made in that glass house, exist to-day, showing that this product of chemical activity had for its purpose a means of effecting trade with the aborigines, who were attracted by the pearly, colored objects. And in 1619, two or three furnaces for the reduction of iron ores were in operation not far away.

Chemistry was rapidly serving man in this then distant land at a day less than a century and a quarter after its discovery by the immortal Columbus. What more might have been accomplished in addition to the extraction of coloring matter from new plants, in addition to the isolation of substances possessing medicinal virtue, can only be conjectured, for further attempts were frustrated by the frightful, appalling massacres perpetrated by the Indians in 1622. The glass house and furnaces were completely demolished. Dead was chemistry in its applications at Jamestown.

To the Old Bay State, the student must next go. For there it was that John Winthrop the younger, a graduate of Dublin, an early member of the Royal Society, inaugurated chemical work by the development of ore industries, which he carried far along in the State of Connecticut, of which he became the first Governor. He held frequent correspondence with scientific friends in London. At their suggestion, and following, too, his own thought, he experimented widely, bringing to light many highly interesting facts, afterwards placed upon the pages of the Proceedings of the Royal Society. As an associate of the leading alchemists of England, as a believer and promoter of the art of transmutation of the baser into the nobler metals, he breathed into the atmosphere about him the spirit of the projector or alchemist; and traces of that spirit continued far into the 18th century, subtly enchaining a son of Yale, born in New Haven, a minister of the Gospel, a lawyer, and again a preacher of the Word, and finally, seventh President of Yale—Ezra Stiles.



DR. EDGAR F. SMITH

Yale's First Promoter of Chemistry

It is he who must be regarded as Yale's first promoter of chemistry. In existing records it is noted, among other things, that Stiles repeated Priestley's experiments on fixed air; that he impregnated water with it, thereby making artificial "Spa water"; and that in his leisure moments, generally at night, he tried certain reagents, and wrote; "If spirits of sea salt or the muriatic acid be drawn over the semi-metal called mangenese, it becomes a solvent of gold." This fact had been mentioned by a Mr. Jones, who delivered a chemical lecture in New Haven. And from this same Mr. Jones, Stiles had received a quantity of vitriolic æther which apparently engaged his study for quite a little while. He observed that "the æther imbibed a solution of gold and the next day when commixt with the aqua regia was again separated and held the gold distinctly separated."

All this while Stiles was reading Macquer's Chemistry, from which he made a selection of experiments, performing them with more or less success, always at night. He was truly an enthusiastic student of chemistry. Men who had had experience in the science visited him and together they held discourses on chemistry and made inquiry concerning the hermetic philosophy. Stiles was in ecstasies when Dr. Eneas Munson, of New Haven, showed him a piece of malleable, whitish metal, "which he himself made within a month past. It was fixed mercury, the first I ever saw," said Stiles.

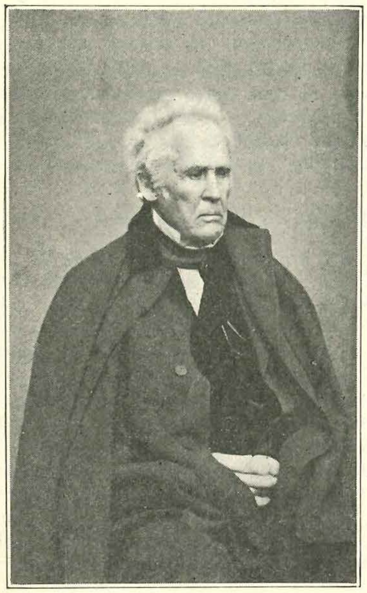
One gathers from the notes of Ezra Stiles that in addition to his many duties as President and Professor in Yale, his fondness for chemistry led him to speak of it and of the remarkable discoveries, unfolded through its agency, to his classes. He corresponded with Franklin, whom he idolized, and to him he gave account of his practical work in the science. Self-trained, it is but natural that he should have presented his subject in a crude form. There is also no question but that the matter of projection or transmutation was in his mind. He endeavored to free himself from it, with but partial success, for he was the intimate of Dr. Munson, Judge Danforth, and the Reverend Mr. West, of whom he said: "They believed in the reality of the Philosopher's Stone, although neither of them ever obtained it." And in his diary occur these words: "Terra Fol, aethere sublata hodiê." Absolute proof that he was really dabbling in alchemy! And yet, perhaps because in the thought of most people, alchemy, the black art, belonged with witchcraft, Ezra Stiles did not care to be allied with those who practiced the latter. He was perturbed; and, a little suspicious of himself, exclaimed: "I am not versed in the books of the adepts. I have seen but a few of these authors and read less. Perhaps all the little I have read collectively would not equal a common octavo volume. I am infinitely less acquainted with them than any other of the sciences in the whole encyclopædia. I have never observed the Extracted Sulphur of Gold in Terra. I have no practical knowledge of the matter: the few ideas I

have about it are only imaginary, conjectural, and speculative. Coram Deo Veritas."

Dear old Dr. Ezra Stiles! We rejoice that you turned from witchcraft, which looks backward, but are profoundly thankful that you were, despite your lovely disclaimers, allied with alchemy, which looks forward; for truly it was experimental science in the making, a science that does not yet acknowledge its finite bounds but aspires, star-eyed, to illimitable possibilities. Yes, you were Yale's first experimenter in the science which has called us together this morning, and may your benign, fatherly spirit at this moment rest approvingly upon all who are here, rejoicing with Yale in this new abode of chemistry.

Silliman the elder

Time rolled on. The soul of Ezra Stiles went out on the lonesome trail, and another son of Yale who, like Stiles, became a lawyer, but animated by the latent purpose of the dear old alchemist in his predilection for chemistry, heeded the call of Alma Mater, in 1802, to the chair of chemistry. Before assuming its duties, however, he journeyed to Philadelphia, then the center of art, literature, and science, that he might sit at the feet of James Woodhouse, the Napoleon of experimental endeavors in America. Let us, for a few moments, follow this eager, earnest student—Benjamin Silliman, the elder.



BENJAMIN SILLIMAN

What a delightful company awaited him in his lodging house in the City of Brotherly Love: Horace Binney, Charles and Elihu Chauncey, and Robert Hare,—young men of great prominence—educated men—men of elevated position in society, their manners in harmony with their training. Silliman wrote: "As Robert Hare was a brewer of porter and was one of our number, his porter was in high request, and indeed it was of an excellent quality. He was a genial, kind-hearted person, a year younger than myself, and a proficient in chemistry upon the scale of that period. Hare invited me to join him in the study of his oxy-hydrogen blowpipe."

While perceiving that this instrument was ingenious, Silliman saw that it was unsafe as regards the storage of gases, and its correction in this particular was entirely due to him.

It was a genuine pleasure for Silliman to stand by his friend Hare in 1802 when the latter repeated his blowpipe experiments before Dr. Joseph Priestley, James Woodhouse, Thomas Cooper, Adam Seybert and others. One wishes that he might have a picture of that group!

The possibilities of the oxy-hydrogen flame were constantly in the thought of Silliman, and the very first pneumatic trough, including Hare's blowpipe, was constructed by Silliman for the laboratory of Yale College in 1803. In later years he wrote: "The fusion and combustion and complete dissipation of platinum, gold, silver, nickel, cobalt and most of the metals, and the fusion of the principal earths and of their more refractory compounds have been made familiar and easy class experiments of every course of chemistry in Yale College for years."

Silliman and Hare were pupils of Woodhouse, who, when interrogated upon the brevity of his didactic lectures, replied, "that no man could dwell, in discussion, on a single topic more than five minutes without talking nonsense."

They were acquainted with his laboratory and the remarkable experimental work conducted by him, but in their leisure hours did very independent thinking and experimenting in their own laboratory in the basement of their lodging house.

To them it was delightful and profitable to meet Dr. Priestley very frequently at the home of Wistar. As Silliman was taking a broad view of science and its teachings, his hours with Wistar, the anatomist, Barton, the botanist, and Seybert, the mineralogist, were precious. In his mind were revolving brilliant schemes for the elaboration of all these subjects, side by side with his thoughts on chemical research.

His friendship with Hare was unique. From their correspondence, continuing through life, it may be inferred that they were believers in and real promoters of genuine experimental science. They discussed its possibilities to and fro, and mutually submitted plans for the elucidation of the chemical and physical problems which interested them. While their active co-experimentation ceased upon Silliman's return to Yale in 1804, they wrote many letters regarding their common love—chemistry

Silliman began his teaching career in a subterranean lecture room fitted up for his laboratory, which was fifteen or sixteen feet below the surface of the ground. It was inconvenient, it was so gloomy,—but there he courageously worked for fifteen years. There he analyzed minerals and meteorites, and invented and perfected apparatus for demonstration purposes in chemistry and physics. In 1805 he was off again. This time to Europe, meeting in London Frederic Accum, and Humphrey Davy; and in Edinburgh, John Murray and Thomas Charles Hope, the polished, stately and formal gentleman who succeeded the gifted Joseph Black. In Edinburgh, Silliman fairly reveled in the teachings of the Wernerian and Huttonian geological schools. He grasped the prevalent geological thought. But in 1806 he returned to New Haven, his days of tutelage passed and his actual teaching career begun. Mineralogy, geology, and pharmacy were added to chemistry. He proved a most inspiring teacher, and founded in 1818 that splendid medium of circulating the scientific work of his colleagues and himself—the *American Journal of Science,* now in its 105th year; and further, he was prominent in the establishment of many Yale activities, flourishing at this moment,—the Art Gallery, the astronomical observatory, the Medical School and the Sheffield School of Science.

But to look once more upon Silliman as a research chemist. His fidus Achates—Robert Hare—had devised an unusual battery—a plunge battery of powers not before suspected. Hare transmitted all his experiences with this instrument to Silliman and even sent him a well-constructed *deflagrator,* as it was termed. Both experimenters marvelled at the occurrences on attaching carbon rods to the deflagrator and studying the arc which ensued. In March, 1823, just one hundred years ago—Silliman wrote Hare: "I gave you . . . . . . an account of the fusion and volatilization of carbon by the use of your Galvanic Deflagrator. I have now to add, that the fusion of plumbago (black lead) was accomplished yesterday by the same instrument."

Again Silliman sought to ascertain the behavior of diamonds in the oxy-hydrogen flame, and said: "They exhibited marks of *incipient fusion."* And thus it continued. Should the thought enter the mind of any one that Silliman was not a producer in his favorite science, let him read the voluminous correspondence which passed between him and Robert Hare. He will then promptly assign him a high place among researchers. The story of his laboratory would make a good prelude to the history of university education in this country as distinguished from collegiate.

Silliman possessed the genuine instinct of discovery, the quick recognition of new and interesting facts, and enthusiasm in following them up to novel and important results. That his successes in other directions somewhat overshadowed them does not detract from their permanent value, "for it must not be forgotten that those who smooth the road to science, and facilitate its acquisition to others, are often more permanently useful than such as are supereminently learned themselves: the greatest personal or mental acquirements die with the possessor; but those who labor that others may be wise, are a benefit to all posterity" (Mavor).

Is it not to the inspirational teaching of Silliman that American science is indebted for Dana, world-renowned geologist and mineralogist, Brush, whose exhaustive mineralogical chemical studies are authoritative everywhere, Johnson, pioneer leader in chemistry applied to agriculture, Willard Gibbs, first among

physical chemists of modern times, T. Sterry Hunt, profound in chemical philosophy and theory, and hosts of others,—giants in the world of natural and physical science?

Last evening I stood "under the friendly silence of the moon" before the bronze figure of Benjamin Silliman, out on yonder Campus; how I wished that I might speak out my thoughts to you! I did whisper to him: "To you, revered Master, we are indebted for this magnificent laboratory. Your spirit, mysteriously conveyed to your successors in order, caused science—particularly chemical science—to so permeate the curriculum of Old Yale that the subterranean laboratory has been brought to the surface, enlarged, developed and endowed, that its rays may illuminate the world—far and wide."

We chemists here assembled say to Yale that we are not envious—no, we are happy, felicitating you with all our hearts and with you thanking God that Silliman, the elder, was born.

As one arranges in a simple vase
A little store of unpretending flowers,
So gathered I these records of past days,
And trust them . . . . . to thy grace.

—o—

Yale Papers in Section Meetings

Of the three hundred and sixty papers presented at the various sections and divisions of the American Chemical Society on April 5 and 6, twenty-eight were contributions from Yale.

Professor B. B. Boltwood, '92 S., spoke before the Division of Industrial and Engineering Chemistry at a symposium on "Materials of Chemical Equipment" on the "Construction of the Sterling Chemistry Laboratory," discussing the use of resistent materials for sinks, drains, hoods, bench tops, fume ducts and drying ovens and the special type of plumbing employed throughout. Professor Boltwood has given most of his time since this building was begun to the details of construction.

In the division of Cellulose Chemistry, Professor Harold Hibbert presented the following papers:

"Cyclic Acetals from Tetramethylene Glycol" (with Dr. H. S. Hill, '19 S.)

"Speculations on the Formation of Products Related to Lignin." Professor Hibbert also participated in a symposium on "Oxycellulose, Cellulose Hydrate and Hydrocellulose."

Professor George S. Counts, of the Department of Education, spoke before the Section of Chemical Education on "Needed Research on the Teaching of Chemistry in Secondary Schools."

Professor Lafayette B. Mendel, '91, of the Department of Physiological Chemistry, presented a paper before the Division of Biological Chemistry on "Animal Experimentation and the Science of Nutrition," this being a part of the symposium on the subject of nutrition. Dr. Thomas B. Osborne, '81, of the Connecticut Experiment Station, who has collaborated with Professor Mendel for many years and whose work on vegetable proteins is classic, spoke on "Problems yet to be Solved in Connection with the Protein Requirements in Nutrition with Suggestions as to the Possibility of their Solution."

Donald H. Andrews, '20, who is a candidate for the doctorate degree this year, presented a paper before the Division of Physical and Inorganic Chemistry on "The Interpretation of Time-Temperature Curves." Mr. Andrews has devised a very ingenious form of apparatus so constructed that the substance under observation loses heat at a rate proportional to the temperature difference between the substance and its surroundings.

G. T. Kohman, who is also a candidate for the doctorate of philosophy in June, spoke in the same division on "Simplified Construction of Ternary Freezing Point Diagrams." He has been able to construct solubility diagrams from a small number of observations, and use these as a means of analyzing mixtures of isomeric organic compounds. Messrs. Andrews and Kohman have been working under the direction of Professor John Johnston and Professor R. G. VanName.

Professor I. V. Hiscock of the Department of Public Health addressed the Division of Water, Sewage and Sanitation on "The Status of Laboratory Control of Water Supplies and Sewage Treatment in Large Cities of the United States in 1920."

In the Division of Organic Chemistry, the showing made by Yale chemists was excellent.

Professor Treat B. Johnson, '98 S., was represented by the following papers:

"Application of Catalytic Reduction in the Pyrimidine Series (with Dr. E. B. Brown, '12 M.A., National Tuberculosis Association Fellow)

"Tuberculinic Acid, the Nucleic Acid of Tubercle Bacilli" (also with Dr. E. B. Brown)

"The Catalytic Decomposition of Glycerides" (with Francis L. Simons)

"The Biochemical Importance of the System: Formaldehyde, Ammonia and Prussic Acid" (with Dr. H. Wade Rinehart)

"Salts of Pseudothioureas and their Application in the Identification of Organic Acids" (with Dr. J. J. Donleavy, '16 S.).

Professor Arthur J. Hill, '10 S., gave the following papers including the work of several research students:

"Ethers of Diethyl Malonate and Barbituric Acid" (with DeWitt T. Keach, '15 S.)

"The Preparation of Acetylenes from Dihalides" (with F. T. Tyson)

"The Action of Diazomethane on Cyclic Ureides" (with F. H. Case)

"Local Anaesthetics of the Holocaine Type (with I. Rabinowitz, '20 S.).

Professor Harold Hibbert had the following papers:

"The Role of the Catalyst in Reactions Involving the Carbonyl Group"

"Dimethylcyclopentenealdehyde" (with Dr. Roland R. Read, now of the University of Vermont)

"Use of Acetylene for the Synthesis of Cyclic Acetals" (with Dr. H. S. Hill, holder of the Antoine Chiris Fellowship)

"Partition Experiments in the Formation of Cyclic Acetals" (with Dr. H. S. Hill)

"The Action of Traces of Iodine on Organic Esters"

"The Action of Chlorine on Organic Esters" (with R. S. Montonna).

Dr. Oskar Baudisch, Research Associate, and Dr. L. W. Bass, '19 S., presented these papers as a result of their joint investigations:

"A New Photochemical Color Reaction (with demonstrations)"

"The Influence of Certain Gases on Ferrous Bicarbonate"

"The Action of Hydrogen Peroxide and of Sodium Pentacyano-Aquo-Ferroate on Thymine"

"The Action of Iodine Solution and Sodium Bicarbonate on Thymine."

Dr. C. S. Palmer, National Research Council Fellow, spoke on "Secondary Aliphatic-Aromatic Arsines."

The paper which probably attracted the greatest amount of attention was that given by Dr. E. B. Brown, National Tuberculosis Association Fellow, who has been working for the past two years under Professor Treat B. Johnson on the chemistry of the Tubercle Bacillus. These investigators have isolated the most characteristic part of the bacillus, a substance known as nucleic acid, which is composed of certain nitrogen compounds, phosphoric acid and a sugar. There are two types of nucleic acids, those of known animal origin and those of vegetable origin. They have isolated and proven by accurate tests the presence of the nitrogen compound known as "Thymine" and also a six carbon sugar, which proves the tubercle bacillus to be of animal origin. This is regarded as the first accurate investigation of the chemical nature of the tubercle bacillus, and the results are expected to be of far-reaching value in approaching the solution of the problem of tuberculosis.

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YALE ALUMNI WEEKLY

PIERSON 1701
ANDREW 1707
CUTLER 1719
WILLIAMS 1726
CLAP 1740
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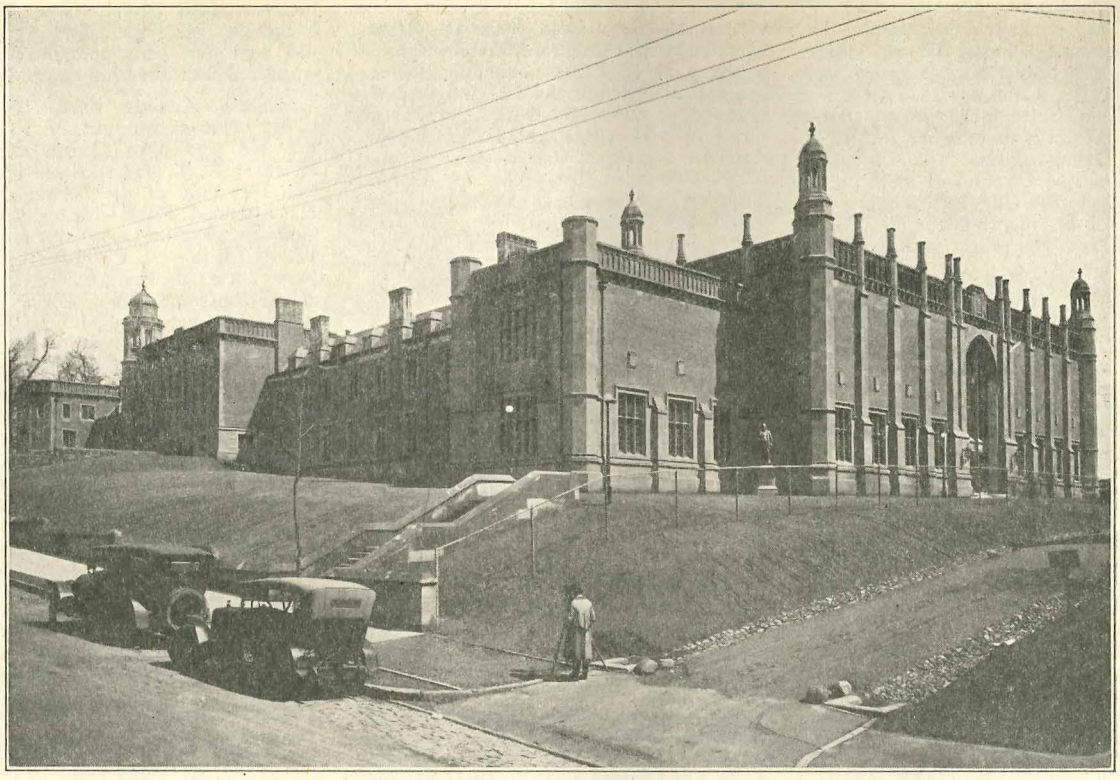

The Sterling Chemistry Laboratory was erected at a cost of $2,000,000 out of the fund left to the University by the late John W. Sterling for building and other specific purposes. It is the largest single building unit devoted to the study of Chemistry in the country and covers about two acres of ground on the Pierson-Sage square, on Prospect Street.

Its opening but typifies the new era in Yale's development

"IT is a superb monument to the love and devotion which John W. Sterling bore to his alma mater. On this spot generation after generation of eager youth will be taught to recognize, to obey, and to direct to man's needs the fundamental laws of Nature. Here the ablest minds will delve continually into Nature's secrets, unlocking her treasures for the increasing happiness of all mankind. Industry and art, agriculture and commerce, medicine and engineering will be the constant beneficiaries of the labor here expended, and best of all will be the evermore penetrating insight into the marvellous composition of the great universe in which we live."

IT was thus and in the presence of the most eminent chemists gathered from this country and abroad that President Angell dedicated to the service of present and future generations the Sterling Chemistry Laboratory.

For Yale men in particular, these words will ring out as the inspiring call of a prophet who has a strong, abiding faith in the deep purposes of the institution and in their fulfillment.

Nor can President Angell's words be misread or misinterpreted. He was quite conscious that he was dedicating a building, "superb monument" though it be, but only a building, a plant, a tool, an opportunity. He knew and meant that the big job had only begun and that Yale's larger contributions to science and to human happiness could become possible only by balancing this most modern material equipment by the ablest teachers and scientists.

AND this is but typical of the whole situation at New Haven to-day. The superb new buildings which have recently been and are shortly to be added make Yale relatively better off in her physical equipment than in her equipment of men for teaching and research.

Not upon the large giver, but upon the great body of her Alumni, through the Alumni Fund, Yale must rely ultimately for those resources which will enable her to keep pace in her spiritual growth with her material development.

"There is literally no limit," President Angell says, "to the development which Yale can quickly experience and no limit to the service she can render granted the funds required."

That is why your Class Agent is so earnest in his efforts to get you to contribute all in your power to the Alumni Fund.

Your Class agent is a hard working volunteer. A prompt reply to his appeal will relieve him of much hard work. Send your contribution to him or to George Parmly Day, Treasurer, New Haven, Connecticut.