QUARTO-CENTENNIAL CELEBRATION.

UNIVERSITY OF COLORADO

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QUARTO-CENTENNIAL CELEBRATION
UNIVERSITY OF COLORADO

NOVEMBER 13, 14 AND 15, 1902

BOULDER, COLO.

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PROGRAMME OF EXERCISES

THURSDAY, NOVEMBER 13.

2:30 p. m.—University Auditorium.

Address before the School of Law: The Quarter Century in American Jurisprudence, FREDERICK N. JUDSON, M. A., LL. B., St. Louis, Mo.

8:00 p. m.—Presbyterian Church.

Grand Concert: MADAME SUZANNE ADAMS, Soprano; MR. LEO STERN, Violoncello; MR. JOHN P. LANGS, Piano. Tickets $1.00.

FRIDAY, NOVEMBER 14.

10:30 a. m.—University Auditorium.

Address before the School of Medicine: The Scientific Aspect of Modern Medicine, FREDERIC S. LEE, Ph. D., Adjunct Professor of Physiology, College of Physicians and Surgeons, Columbia University.

2:30 p. m.—University Auditorium.

Address before the School of Applied Science: The Potency of Engineering Schools and their Imperfections, DUGALD C. JACKSON, C. E., Professor of Electrical Engineering, University of Wisconsin.

7:00 p. m.—University Campus.

Students' Parade, beginning on the Campus, proceeding to the City, and returning to the Campus.

8:00 p. m.—Main Building.

Reception and Reunions.

SATURDAY, NOVEMBER 15.

10:00 a. m.—Presbyterian Church.

Address, PRESIDENT BAKER.

Oration, JACOB GOULD SCHURMAN, D. Sc., LL. D., President of Cornell University.

1:00 p. m.—Gymnasium.

Alumni Dinner to Alumni, Regents, Faculties and invited guests. $1.00 per plate.

OUTLINE ACCOUNT OF THE ENTIRE CELEBRATION

THURSDAY, NOVEMBER 13.

The exercises of the Law School were held at 2:30 in the afternoon. Mr. Frederick N. Judson, a prominent member of the St. Louis bar, gave the principal address. His subject was the "Quarter-century in American Jurisprudence." His treatment of the subject was scholarly and showed a complete mastery of details of progress in jurisprudence.

The grand concert of the Quarto-Centennial Celebration took place in the evening at the Presbyterian church, Boulder. Never in the history of the University had so fine a musical treat been offered to the public. The artists were Mme. Suzanne Adams, prima donna soprano of the Metropolitan Opera House, New York, and Covent Garden, London; Mr. Leo Stern, violoncellist; and Mr. John P. Langs, pianist, the instructor in music at the University. Citizens of Boulder as well as members of the University were delighted to have such an entertainment offered. It was an artistic and social success.

FRIDAY, NOVEMBER 14.

In the morning the University Auditorium was well filled with students, citizens and visitors who listened to an address by Dr. Frederic S. Lee of New York on "The Scientific Aspect of Modern Medicine." Dr. Lee is a physiologist of note whose work at the College of Physicians and Surgeons of Columbia University has brought him into prominence among medical men. In addition to Dr. Lee's address there was a short historical account of the medical school given by Dr. Luman M. Giffin, the dean of the department. Dr. Giffin traced the growth of the department from its founding in 1883 to the present time.

In the afternoon at 2:30 another audience gathered in the auditorium, this time to listen to the exercises of the engineering school. Dean Rowe of the school made a few remarks concerning the growth of interest in scientific engineering in the west and concerning the mission of the State University in the cause of the various applied sciences. He

noted the fact that the engineering school, although the youngest of the professional schools at the University, is now by far the largest and is growing with the greatest rapidity. The principal address was given by Professor Dugald C. Jackson, the head of the department of electrical engineering in the University of Wisconsin, who, besides being a lecturer of note, is also a successful practical engineer. His address was on "The Potency of Engineering Schools and their Imperfections."

The students' parade in the evening was most original. There were floats appropriately decorated and many of the students wore costumes typical of early life in Colorado or typical of the department which they represented.

After the parade came the receptions and reunions in the Main Building. The Reception Committees represented the Faculties, Alumni, Old Timers and present students. There was a very large attendance both of university people and of citizens of Boulder.

SATURDAY, NOVEMBER 15.

In the morning the exercises were held in the Presbyterian church. President Baker gave a short historical address in regard to the University. Dr. Jacob Gould Schurman, President of Cornell University, was the orator of the day. He spoke concerning certain university problems suggested on reading the Charter of the University. Dr. Joseph A. Sewall, first president of the University, made a few remarks. He was followed by Governor James B. Orman. Other addresses were made by visiting delegates from colleges and universities.

In the afternoon the Alumni Dinner was given in the gymnasium. Mr. Richard H. Whiteley acted as toastmaster. Toasts were responded to by Mr. Hugh R. Steele, ex-President Joseph A. Sewall and General Irving Hale.

THURSDAY AFTERNOON

EXERCISES OF THE SCHOOL OF LAW

PROGRAMME.

Music. Priests' March from Athalie. *Mendelssohn.*

ORCHESTRA.

Invocation.

REV. HENRY H. WALKER, Ph. D.

Historical Address.

PROFESSOR ALBERT A. REED, LL. B.

Music—Vocal Solo. In a Persian Garden. *Liza Lehmann.*

MISS MAY WHITMORE.

Address.

The Quarter Century in American Jurisprudence.

FREDERICK N. JUDSON, M. A., LL. B., St. Louis, Mo.

The exercises of the Law School were held at 2:30 p. m. in the University auditorium. After the orchestra number President Baker rose and said:

Before proceeding with the printed programme, I have an announcement to make, one part of it painful, and the other pleasant. It refers to a resignation in the School of Law. In this instance, we can do as is customary in monarchies: we can say "The king is dead" and in the same breath, "Live the king." Judge Hallett has, very greatly to our regret, after

earnest solicitation that he would reconsider, tendered his resignation, made necessary because of the claims of his regular duties, and I believe that he sincerely and deeply regrets that he is obliged to take this step. Judge Hallett was at the beginning; he helped the beginning; in fact, he was the beginning, and he has been with us ever since, giving to us such of his time as he could spare from other very weighty duties. We shall not let him go until he makes his last bow. By the way, I shall, if possible, contrive to attach him to us as an emeritus. I think we will find a way to do it.

Hon. John Campbell, Chief Justice of the Supreme Court, has consented, after urgent solicitation by the Board of Regents, to accept the deanship of the School. Later he will also be asked to make his bow. Judge Hallett.

Judge Hallett said:

I was surprised a moment ago to hear that I should appear before you to make my last bow. I am not therefore prepared to indulge in those reminiscences which accompany service in a school of this kind. I am glad to know that it was not expected that I should do so. Another gentleman who is quite as familiar with the subject as I am, has been assigned to that duty.

I retire from this School with sincere regret, but I am unable longer to continue in this service. The service has always been grateful to me, and I have met here men and women whom I have learned to respect and esteem. I am glad to know that they have been making records for themselves, many of them, in other parts of this State and in other States, and that they are an honor to this institution and to the instructors by whom they were taught. It is gratifying to me to be able to know also that you are not to be altogether abandoned by the judiciary of the State. Upon retiring from this position, I shall be succeeded by the Chief Justice of the State, and you could not drop into better hands.

The next speaker was Judge Campbell, the new Dean of the Law School, who said:

Mr. President: I am not sure that the founders of this University were aware of the fact, but it is true, nevertheless, that the same year that this University was founded was the year that I was graduated from a State University of a sister State. Now I mention that fact to you somewhat in confidence, but at the risk of giving you a clue to the ripe old age to which I have attained. When I received from President Baker an invitation to be present at the Quarto-Centennial celebration, I thought that I could appropriately come, because I could help celebrate the quarto-centennial of my graduation at the same time. Now, I am sure that so long as Judge Hallett, who was the first Dean of the Law School of the State University, was willing to give of his time to the duties of that office, that there was no one in this State who wished to see any one displace him. It was only after I had received assurances from him that it would be impossible for him

longer to continue in that office that I agreed to accept the appointment which the Regents have tendered to me. I cannot hope to reach the degree of success which he has in the discharge of his duties, but with the assurances of the Regents and of Mr. Reed, the Secretary of the Faculty, that I shall be relieved of much of the detail of the work, I have consented to give as much of my time and as much of my attention to the duties of this office as I can spare from the work which I must necessarily perform. I can only say that with the help of the resident Faculty and of the instructors and lecturers of the University, I hope that we shall be able to keep up the work which has begun so auspiciously under the leadership of Judge Hallett.

President Baker next introduced Professor Albert A. Reed, the secretary of the Law School, who gave a short address outlining the history of the School. Professor Reed spoke as follows:

ADDRESS BY PROFESSOR ALBERT A. REED.

The catalogue of the University published in the Spring of 1892 contained the following important announcement: "The Regents have decided to open a Law School at the University, September next, provided suitable arrangements may be made. Without doubt the department will be opened at that date under the management of the strongest law faculty that Colorado can furnish."

This notice, simple in form, had been preceded by careful consideration of the needs of the State and the opportunities for work in this department of education. President Baker had recently been chosen chief executive of the University and among other important matters the organization of this professional school received his earnest attention.

With the advice and encouragement of the Regents, aided by valuable suggestions from Judge Hallett, Mr. Charles M. Campbell and others, the plans for the school were formulated.

During the summer of 1892 a Prospectus was published and given wide circulation. On the title page of that publication is the following language —a quotation from the late Chief Justice Waite:

"The time has gone by when an eminent lawyer, in full practice, can take a class of students into his office and become their teacher; once that was practicable, but now it is not. The consequence is that the law schools are now a necessity."

One of the most devoted friends of the department in those early days was Mr. Campbell, then secretary of the school. A large part of his time was cheerfully given to promote its interests. He prepared the first literature printed for the use of the school. In an introductory note published in the first bulletin he wrote:

"That amazing changes have taken place in this country within the last few years in regard to legal education and that great advances have been made, is manifest from the well equipped Law Schools connected with our Universities. The old fashioned method of studying law in the office of a practising attorney is almost a practise of the past; just as the old fashioned method of studying medicine is practically abandoned. This change has come about slowly, and although not fully accomplished, nevertheless, the efficient instruction in the Law Schools is receiving the general recognition of the eminent jurists and lawyers in every State in the Union. The prevailing opinion of the Bench and Bar is, that the theoretic study of the law, as a preparation for legal practise and professional success is best attained in the lecture room of the law school, where the fundamental principles of English and American law are taught by able lecturers and instructors."

The Regents had announced that the law faculty would be a strong one; they kept their promise. The names will be recognized as those of leaders of the bar of this State:

Moses Hallett, Vincent D. Markham, Ebenezer T. Wells, Willard Teller, Hugh Butler, John Campbell, Oscar F. A. Greene, Charles S. Thomas, Charles M. Campbell, Merrick A. Rogers, Alfred C. Phelps, William C. Kingsley and George Rogers.

The school opened in conformity with the announcement. The enrollment for the first year was twenty-three, of whom twelve finished the course of study and were awarded the degree, "Bachelor of Laws." With one exception (Mrs. Dunham) the first graduates of the law school are living, are actively engaged in the practise of their profession and all have attained a considerable measure of success.

In 1895 Wm. L. Murfree, of St. Louis, was elected Professor of Law. Under his wise management the department reached a higher standard of efficiency. The library was enlarged, the requirements for admission were carefully revised and the character of the work done in the school was materially strengthened. Those who knew Professor Murfree well and who are informed about his influence upon our law school will not hesitate to give him large credit for the place which our department occupies in its relation to education at the University of Colorado.

In 1897 it was resolved to modify and enlarge the course of study so that it would cover a period of three years instead of two years. There was some apprehension lest this change might have a tendency to diminish the attendance, but the result demonstrated that our fears were without real foundation. The three year course was inaugurated in September, 1898, and our department opened with a larger number of students than ever before.

About the same time the rules were amended so as to require the applicant for admission to present evidence of graduation from an accredited high school or an equivalent. The policy of encouraging a better prelim-

inary education will, we think, meet with unqualified approval from the members of the Bench and Bar of this State.

The methods of instruction employed in the department have not greatly changed; they are now, as in the earlier years, a combination of text book, case work and lecture systems. The work of the school has been extended to cover many topics not treated in former days. Increasing attention has been given the matter of teaching practise. This branch of legal study had the warm support of the late Professor Murfree. The following extract from our catalogue contains a suggestion of his ideas on this subject: "The transfer of legal education from the office to the law school has been marked by a great gain in thoroughness and fullness. But the loss of the training in practice afforded by the business of the office is much to be regretted. It provided the student a sort of law clinic, the want of which must now be supplied by the law school if his legal education is to be complete. He must not only be taught the principles of procedure in all its branches, as jurisdiction, pleading, evidence, trials and appellate relief, but he should see these principles in actual practical application. To some extent he may do this by attendance upon the courts and close observation and study of the proceedings there. But, beside being a silent spectator in public courts, the student should have a court of his own, where he may devise remedies, sue out process, draw pleadings, prepare instructions, make briefs and argue questions of law—and perhaps of fact—frame record entries, save exceptions, and preserve them in the record, and take the case up on error, or by appeal. To supply this need, the Regents of the University have authorized a Practice Court, presided over by a professor of practice. A court room, including a clerk's office, has been provided; and the records and files are kept and the proceedings of the court conducted in conformity with usage and practice in the District Courts of Colorado."

In the early part of 1902 our school suffered a serious loss in the death of Professor Murfree, who had devoted his entire energies to the promotion of its interests. His whole-hearted service will be long remembered by faculty and students.

Later in the year the Regents regretfully accepted the resignation of Hon. Moses Hallett, who had been Dean of the Law School from its organization. The value of the name, the personality and the services of Judge Hallett in connection with this branch of the University's work can hardly be measured. It is with the greatest sorrow that we contemplate the retirement from active service of our late Dean, whose interest in the work has been so great and whose instruction so highly prized by our students.

Within the last few days the Regents have announced the appointment of Judge Hallett's successor; we are happy to know that the appointment has been accepted and Hon. John Campbell, Chief Justice of the Supreme Court of this State, is now our Dean. I think I am warranted in pledging to Judge Campbell the enthusiastic support of faculty, alumni and students.

Since the organization of the Law School, we have enrolled 270 students. For various reasons many fall out by the way and do not finish the course. It is generally true, however, that the better prepared students remain to receive degrees. The graduates of our department number eighty-two. In 1894 twelve, 1895 six, 1896 seven, 1897 nine, 1898 nine, 1899 thirteen. In 1900, in consequence of the change in 1898 from the two-year course to the three-year course, there were no graduates; in 1901 twelve were graduated and in 1902 fourteen.

Our school is still in its infancy, the graduates are young men; yet not a few having gained distinction in the profession. Although but eight years have passed since the first class was graduated, we have several judges and district attorneys among our alumni. They are loyal to the institution whose degree they claim. The foundations of the school have been laid, the work done has been creditable; as the commonwealth grows this department must expand and enlarge its sphere of usefulness. Our aims are to train the youth of the State in the fundamental principles of the English Common Law, to inculcate normal ideas of right and justice, and to fit our students to take such a part in public affairs as will yield the best results for the whole people and bring honor to themselves and the institution from which they have gone forth.

Introducing Mr. Judson, the principal speaker of the occasion, Dr. Baker said:

We were indeed fortunate in securing the speaker of to-day. Mr. Judson is known not only as a lawyer, but as an author, and also as a good citizen. What I mean by a good citizen in this case is a man who takes an interest in public affairs, and engages in needed work of great reform. Mr. Judson is noted as taking a great interest in whatever may be necessary for the public welfare, and has been connected with many reforms in his own State. As he wrote me, he feels not altogether a stranger to us, because our Professor Murfree, as he expressed it, "was brought up in his office." We welcome him here to-day. Hon. Frederick N. Judson.

ADDRESS BY MR. FREDERICK N. JUDSON OF ST. LOUIS, MO.

THE QUARTER CENTURY IN AMERICAN JURISPRUDENCE.

Mr. President and Ladies and Gentlemen:

Your kindly introduction and reception are deeply appreciated. The invitation to join in this celebration of the anniversary of the University appealed to me with peculiar significance. My lamented friend, Mr. Murfree, your late professor of law, had given me for several years past a personal interest in the foundation and development of your law department. We had been life long friends. He was one of my pupils in his school days,

and a student and practitioner in my office. I join with you in deploring his death, untimely indeed, while his life work was yet unaccomplished.

This is an occasion of exceptional historic interest, not only to you and those interested in the University, but to the country at large. Colorado was the Centennial State, and as your University is almost coeval with your State, this quarter century substantially marks the first quarter of the second century of our national independence. My own State is soon to celebrate the great Louisiana Purchase, whereunder the territory of your State was secured to the American Union, and as your sister State in the territory of that Purchase, sends you greeting.

These educational foundations are founded not only for the present, but for coming generations. These anniversaries therefore have more than a sentimental or even a patriotic signincance. As generation succeeds generation in these halls of learning, these recurring anniversaries serve as the great marking stones of human advancement. The past quarter century has been one of marvelous business and economic progress. About a year since I attended the Bi-Centennial celebration of my own alma mater, Yale University, and heard there recounted the progress of civilization during the past two centuries. But the progress in the last quarter century was greater than in any other period of that time there recounted, and indeed greater than in any similar period of the world's history. The world of 1902 is a far different world from that of 1877. As a subject germane to this occasion, I ask your attention to:

THE QUARTER CENTURY IN AMERICAN JURISPRUDENCE.

The century preceding the foundation of this University, which is coeval with the first century of our independence, is notable for great legal reforms. They were impressively summarized by the Supreme Court of the United States a few years since in sustaining as valid under the Fourteenth Amendment a State statute regulating the hours of labor. Thus were enumerated the simplification of legal procedure by the elimination of the whole fabric of special pleading, the abolition of the exclusionary rules of evidence, the sweeping away of the ancient tenures of real estate, the abolition of imprisonment for debt and the emancipation of married women.

The court truly said that these reforms had commenced even before the adoption of our Constitution. Indeed our independence was declared at a notable period in the history of our jurisprudence. Blackstone's Commentaries had then been recently published, and Lord Mansfield, the greatest of common law judges, who was justly called by one of his successors the father of the commercial law of England, had been for several years the Lord Chief Justice of the King's Bench. Of Lord Mansfield, his biographer, Lord Campbell, says: "He formed a very low, and I am afraid a very just, estimate of the laws of England which he was to administer. * * His plan seemed to have been to avail himself as often as opportunity admitted

of his ample stores of knowledge acquired from his study of the Roman civil law and the juritical writers produced in modern times by France, Germany, Holland and Italy."

It was said by a distinguished jurist of this country in a recent address, that the common law at the time of the revolution, relating to land, private obligations and procedure, was but little advanced beyond semi-barbarism.

SIMPLIFICATION OF PROCEDURE.

Prominent, if not foremost, among the legal reforms of the century which preceded the foundation of this University, was the simplification of legal procedure. The archaic condition of the law of procedure is illustrated by the fact that trial by battle was not formally abolished in England until 1819, and it is only in comparatively recent times that the relation of procedure to substantive law has been clearly and definitely understood. The great leader in this reform in England was Mr. Bentham, in the early part of the century, and it was not until many years after his death that the reforms which he advocated were accepted and adopted both in England and America. The reform code pleading was adopted in New York in 1849, and nearly all the States have followed. Lawyers trained in the common law pleading naturally looked upon this innovation with suspicion and distrust. But no State which has adopted this reform procedure has returned to the ancient common law pleading, and no State which has abolished any of the ancient exclusionary rules of evidence has restored them. We would be as much surprised now to hear of such a suggestion as we would of the return to trial by ordeal or wager of battle.

During the quarter century which has passed, the quarter centennial whereof you are now celebrating, this movement for the simplification of procedure has gone progressively forward. Investigations in historical jurisprudence have demonstrated that extreme technicality in procedure, such as we had until a comparatively recent period in our own law, and such as we find in the Twelve Tables of the Roman Law, is the sign of an undeveloped system of law, in which legal rights are subordinate to the procedure to enforce them, in which substance is secondary to form. Thus Sir Henry Maine says that technicality is a disease, not of the old age, but of the infancy of legal systems, and he adds:

"It would not be untrue to assert that, in one stage of human affairs, rights and duties are rather the adjective of procedure, than procedure a mere appendage to rights and duties. There have been times when the real difficulty lay, not in concerning what a man was entitled to, but in obtaining it, so that the method, violent or legal, by which the end was obtained, was of more consequence than the nature of the end itself. As a fact, it is only in the most recent times or in the most highly developed legal systems, that remedies have lost importance in comparison with rights, and have ceased to affect them deeply and variously."

That profound legal scholar, the late Professor Thayer, whose collection of cases on the law of evidence I see you have included in your curriculum, says that the body of judicial business of public courts seven or eight centuries ago, lay in administering rules that a party should follow this established formula or that, and according as he bore the test he should be punished or go quit. Formalism in these early stages of society was a step, but one of the first steps, towards a rational system of determining controversies. It was better than private war. Thus the determination by chance or by wager of battle, was an advance upon the primitive state, where men took the law into their own hands.

The important fact, therefore, in this progressive development of our jurisprudence is the growing recognition that the demand for simplicity in procedure does not spring from ignorant revolutionists or radical iconoclasts, but is a necessary step in the progressive advance of a rational jurisprudence. As forms were regarded with superstitious reverence in the early stages of society, we now recognize that the simpler the procedure, the better it serves its purpose. Time and experience have demonstrated the wisdom and necessity of these changes, and we can no more return to the old order of things than we can stop the course of time. This does not mean that accuracy and precision of statement in judicial pleadings will be any less important than they are now. The faculty of clear and concise statement of the ultimate and constitutive facts in issue will always be effective. But substance, and not form, will be of the first importance.

Some of our most eminent jurists, including Judge Dillon, believe that the separation of what we call equity from law was originally accidental and unnecessary, and that the development of an independent system of equitable rights and remedies is anomalous and rests upon no principle, and that the tendency will be for equity to be merged in the law.

Distinct chancery courts have been abolished in England and in nearly all the States of this country. The distinction between common law and equitable remedies remains, though they may be administered by the same tribunals in what we call a civil action.

THE JURY SYSTEM.

Closely allied with these changes in the simplification of the procedure is the great change still going on in the profession as well as in Laws and Jurisprudence in England and America, in the popular mind, concerning our historic jury system. Although for centuries unanimity has been a peculiar and essential characteristic of trial by juries at common law, and the Supreme Court of the United States has held that a Territory had no power to change this rule,* it has been changed in many States. Thus in civil actions in California, Idaho, Louisiana, Nevada, Washington and Missouri, a three-fourths vote may render a verdict, while in Montana two-thirds

*American Pub. Co. vs. Fisher, 166 U. S., 464.

in civil actions and in crimes less than felonies, and five-sixths in Idaho in all cases of misdemeanor. It is not probable that public opinion will ever consent to any material change in the jury system in criminal cases. As to civil cases, however, there is a distinct trend in favor of material change, and at least as to the unanimity rule, and as to the elevation of the standard of intelligence of the jury. On the other hand, eminent jurists have given their testimony in favor of the jury for determining issues of fact when properly directed and advised by the court. Thus the late Justice Miller says: "I must say that in my experience in the conference room of the Supreme Court of the United States, which consists of nine judges, I have been surprised to find how readily those judges come to an agreement upon questions of law, and how often they disagree in regard to questions of fact, which apparently are as clear as the law. I have noticed this so often and so much that I am willing to give the benefit of my observation on this subject to the public, that judges are not preeminently fitted over other men of good judgment in business affairs to decide mere questions of disputed fact."* Notwithstanding this, however, we cannot overlook the fact that there is a growing tendency to dispense with juries except in cases where unliquidated damages are sued for, or where one of the parties desires to appeal to class prejudice. It has been said that faith in the trial by jury has declined to such an extent that it has come, in many cases, to be a maxim of professional action, that good cases are for the court, bad or doubtful cases for the jury.

In England and in some of the States of this country, a party must ask for a jury in advance in civil cases, and in some special juries of presumed higher order of intelligence may be called by either party on payment of the necessary costs.

In my own State the three-fourths rule for verdicts in civil cases was adopted by constitutional amendment two years since, and popular as well as professional opinion, I think, approves the change as preventing mistrials and conducing to a speedier determination of litigation. Such a change would not have been possible twenty-five years ago, and it is illustrative of the distinct trend in public opinion in favor of speedier determination of litigation, even at the sacrifice of the cherished historic feature of unanimity in our jury system. Furthermore, in considering the future of the jury, we must not overlook the political effect upon the stability of our institutions resulting from the participation of juries in the administration of justice. This feature of the jury system has attracted the attention of foreign observers, and it was notably commented on by De Toqueville, who mentioned it as one of the great conservative forces in our political organization.

CRIMINAL PROCEDURE.

There is a distinct popular demand, which has not yet found full expression in legislation, for a speedier procedure in criminal cases. Lynching

*21 Am. Law. Rev., pp. 861, 863.

is very largely the expression of popular discontent with the existing delays in criminal procedure. It is said that the number of accused parties who are killed by mobs in the United States is greater than is that of the criminals who are executed by the law. There is a strong contrast in this respect, that is, in the promptness and certainty in criminal procedure, not only between the courts of this country and those of Continental Europe, but also between our courts and those of England, though the latter administer as we do the principles of the common law. This was forcibly brought to my attention a few years since in attending a murder trial in England at the York Assizes. The prisoner was indicted for the murder of his wife and child, the crime having been committed a few weeks before and the indictment was returned at that term of court. The defense was insanity. The State was compelled to prove the commission of the crime, and three experts, as I remember, one of them a prison physician, were examined, as also some of the prisoner's family. The trial was commenced about ten thirty in the morning, and with an hour's intermission at noon, was given to the jury about five o'clock; a verdict of guilty returned in fifteen minutes thereafter, the prisoner was immediately sentenced, the judge assuming the traditional black cap over his wig. Some two weeks later I read of the execution. All this was somewhat startling to one who was accustomed to the delays of our American jurisprudence.

One cause of delay in this country is of course the allowance of appeals in criminal cases. I was informed by English barristers, however, that there was a strong feeling in favor of allowing such appeals in England. It is very doubtful whether our people would be prepared for so doubtful a remedy as the abolition of appeals in criminal cases, though it has been advocated by as eminent an authority as Justice Brewer.

Another cause of delay in our American procedure was impressed upon me by contrast with the English procedure in this case, and that was the comparative absence in the English practice of discussions of questions of evidence. Thus during the trial I do not think there were more than two or three questions of evidence raised, and they were promptly decided without discussion. I was informed by English barristers, and this was my observation in attending other trials both civil and criminal, that questions of evidence are not often raised and are very seldom discussed, and that it was very uncommon in civil cases to carry any questions of evidence to the upper courts. One reason of this, as I was informed, is that the judges look with disfavor upon such discussions, and as the influence of the bench is very great, far greater than with us, a very serious cause of delay in our procedure is removed.

THE LAW OF EVIDENCE.

Closely associated with the simplification of procedure is the reform of our law of evidence. Its exclusionary rules, with their modifications,

which have been largely repealed, were the historic outgrowth of the jury system, that is, of leaving to a body of untried, ignorant men the determinations of questions of fact. Thus in cases tried before the court without a jury, as has been often observed, far less attention is paid to questions and rules of evidence. English lawyers who have attended American courts, have expressed themselves surprised at the great amount of time consumed in discussing questions of evidence in the American courts. As Professor Thayer has pointed out, our so-called law of evidence includes many rules of substantive law, and the tendency is inevitably towards the further simplification and to the enlargement of the discretion of the court in admitting whatever is logically probative of the matter in issue, and in excluding only that which is not logically probative, or is excluded on clear grounds of public policy or positive law.

PREROGATIVE WRITS AND PREVENTIVE RELIEF.

Another distinct change in our procedure noticeable in the last quarter of a century is the growing demand necessitated by new business conditions for immediate relief through the use of prerogative writs, as mandamus, prohibition, certiorari, wherein the highest courts are frequently called upon to exercise original instead of appellate jurisdiction. It is also marked in the increasing demand for preventive relief through injunctions, though in this particular this advance in our jurisprudence is checked by the conservatism of our judiciary, who frequently cannot divest themselves of the ancient common law prejudice against this form of equitable interposition. This ancient prejudice has found expression in the United States statutes. Yet notwithstanding this, in the notable case of the Income Tax, the Supreme Court of the United States was compelled to brush aside the statute under the plea that the injunction was against the payment and not the collection of a tax. It was found that uncertainty and delay were so disastrous to the public as well as private interests that the court deemed itself justified in taking jurisdiction and deciding the case upon its merits. Preventive remedies are, under the changed conditions of our times, oftentimes the only effective remedy, even for injuries that may technically, though not actually, be compensated in damages.

THE FOURTEENTH AMENDMENT.

A very important development in American jurisprudence in the last quarter of a century, growing out of the dual character of our government, has been the enforcement by the Supreme Court of the United States of its enlarged jurisdiction under the Fourteenth Amendment, which prohibits any State from depriving any person of life, liberty or property without due process of law, or from denying to any person within its jurisdiction the equal protection of the laws. This amendment, though adopted in aid of reconstruction after the Civil War, and proclaimed in 1868, its vast im-

portance was not recognized until it was invoked in the courts some years later. Although the Supreme Court was at first disposed to construe this amendment as available only for the protection of the colored race, it was soon recognized that it placed the great fundamental rights of all, whether individual or corporate, under Federal protection against, by State authority. This amendment creates no new rights, except in the declaration of national citizenship, and the Supreme Court has been conservative in its construction and has declared that it does not deprive the States of their power, subject to the Federal Constitution, to regulate their domestic concerns. But it has also repeatedly asserted that it prohibits any discrimination by State authority which are of an unusual character and unknown to the practice of our government. It has been called the New Charter of American Liberty. In the language of the late Justice Field, "It is the shield which the arm of our blessed government holds at all times over everyone, man, woman, and child, in all its broad domain, wherever they may go and in whatever relations they may be placed. No State—such is the sovereign command of the whole people of the United States—no State shall touch the life, the liberty, or the property of any person, however humble his lot or exalted his station, without due process of law; and no State, even with due process of law, shall deny to any person within its jurisdiction the equal protection of the laws."

A change, however, has been made in the Federal procedure, which was demanded by the pressure of business and for the relief of the Supreme Court, and that is the establishment of United States Courts of Appeals, with final jurisdiction in a large class of cases, in fact for nearly all the cases of general jurisprudence involving other than constitutional questions. One result of this change is to be deprecated, and that is the loss, in great part, of the unifying influence of the Supreme Court upon the jurisprudence of the country. The decisions of that great tribunal upon the different branches of commercial law, such as insurance and common carriers, has had a great influence upon the jurisprudence of the country, and it is to be hoped that through the exercise of the jurisdiction of the court in the issuance of writs of certiorari to the Circuit Courts of Appeal that that unifying influence will not be wholly lost.

CULMINATION OF CASE LAW.

Thus far we have considered the development of the law of procedure, that is, of the means whereby rights are enforced. The quarter century has also been an eventful period in the department of the substantive law, though the development which we are now to consider relates rather to the written expression of the law than to the law itself. The law has of course expanded in its development and adaptation to the ever varying wants of our complex society and busy industrial civilization. This very expansion, while it has enriched our jurisprudence, has brought with it the culmination

of the case system and the doctrine of judicial precedent, which for centuries has been the distinguishing characteristic of our law.

The fifteen treatises and as many volumes of reports in Lord Coke's time three centuries ago, have grown to many thousands. Judge Dillon, in 1891, estimated the number of reports in England and America at eight thousand. They have since increased at the rate of three to four hundred volumes per annum, so that our written law is now found in over twelve thousand volumes. In a recent volume of the New York Reports, the number of cases cited by counsel was over five thousand. The publishers of the American and English Encyclopedia of Law announced that with their first twenty volumes there was 791,964 citations contained in 22,238 pages, this being a digest of only a portion of the law. The annual digests of American cases and only the leading English and Canadian cases, requires two enormous volumes of over forty-five hundred closely printed double-column pages. The digest for the six months ending in March, 1902, included over twenty-eight thousand digested points from one hundred and fifty-eight volumes of decision and from the "Reporters" giving opinions in advance of the regular reports, this enormous volume representing only the six months' increment. Where is this multiplication to end, and what is the remedy?

It has become a serious question with the profession who maintain private libraries, where they shall find office room for the accumulation of case law. We have now not only the official editions, but advance reports in the various "Reporters." We have reports not only of the highest courts of the State, but reports of the intermediate courts established in a number of States, and of four grades of Federal courts. The original law dictionaries of one or two volumes have swollen into great encyclopedias. One edition of twenty-nine great volumes is hardly completed when a second edition is issued, representing only the substantive law, while another encyclopedia of twenty-three volumes of Pleading and Practice is issued, as well as still another of forms and procedure, these new editions being necessitated by the vast accumulation of case law in the few years since the first edition was published. Now, we have a competing encyclopedia, and our mail is flooded with circulars from these competitors, each criticising the completeness of the other.

This vast accumulation of case law has had an influence, if not upon the quality, certainly upon the length, of judicial opinions. Other causes should not be overlooked, such as short judicial terms in many States, the crowded dockets, the lack of time for condensation, and, perhaps, not the least of these influences is the increasing use of stenography, as it is a matter of familiar knowledge that dictation does not tend to condensation. It is interesting to contrast the opinions of Chief Justice Marshall, many of them having no citations, much less quotations, or the opinions of Lord Mansfield in those great leading cases which mark the period of great development in the English law, with the modern opinions even of eminent

judges. The practice seems to be growing of filling up opinions with quotations from former cases, with reference not only to reports, but to treatises and cyclopedias and even digests. Sir Henry Maine ascribes the extraordinary length of our forensic arguments and legal decisions directly to our theory of judicial precedent, and to our lack of an accurate legal terminology, and he says: "Hence the extraordinary length of our forensic arguments and legal decisions. Hence that frightful accumulation of case law which conveys to English jurisprudence a menace of revolution far more serious than any popular murmurs, and which, if it does nothing else, is giving to mere tenacity of memory a disgraceful advantage over all the finer qualities of the legal intellect."

THE DOCTRINE OF JUDICIAL PRECEDENT.

We all know the case lawyer, who knows cases and has a certain facility in finding them, but knows little else. Under this system the labor of the lawyer, says Mr. Maine, is to extract from the precedents a formula which, while covering them, will also cover the state of facts to be adjudicated upon, and the task of rival advocates is from the same precedents or authors to elicit different formulas of equal apparent applicability. Tennyson has characterized the system as:

> "The lawless science of the law,
> The codeless myriad of precedent,
> That wilderness of single instances
> Through which a few by wit or fortune lead,
> May beat a pathway out to wealth and fame."

The last quarter of a century has been marked by the earnest discussion by our thoughtful jurists of this accumulation of case law and by the growing conviction among them that the doctrine of judicial precedent, that is, the authority of adjudged cases, will be profoundly affected.

Time will not permit any detailed discussion of this doctrine, its historic development and its qualifications, or of the theories of philosophers and jurists as to the basis upon which it rests. "The life and soul of English law have ever been precedent." It is needless to discuss whether the judges make law, as Bentham and Austin said, or only declare it, as was the view of Blackstone and Hammond. We are forced now to deal with a condition, and not a theory. How can we use adjudged cases in this enormously increasing volume, so that the law may still be enriched and developed by new applications, and yet its principles be expressed in a form consistent with the essentials of certainty, convenience and accessibility? One result will be, as thoughtful jurists have observed, that the importance of the case lawyer will be diminished, as the labor of examining the multiplied reports becomes more and more onerous, and of necessity resort must be had to established principles. There is a growing tendency

in our courts to overrule their own decisions, when change in the membership of the court or reconsideration satisfies them that the earlier rule was erroneously declared or has become unsuited to changed conditions. We have notable illustrations in the decisions of the Supreme Court of the United States in great constitutional questions, as in admiralty jurisdiction, the legal tender cases, the regulation of interstate commerce and the income tax cases. So frequently have such cases occurred in the State courts, that the rule of constitutional law has been declared by the Supreme Court of the United States that contract rights may be impaired by a change in judicial decisions, and that such decisions reversing former constructions of State statutes whereunder contract rights have been acquired can only be applied prospectively.

Judge Baldwin, of the Supreme Court of Connecticut, an eminent jurist, says in a recent address: "We have given, I cannot but think, an undue prominence to judicial precedents as a natural source or enunciation of the law. The multiplication of distinct sovereignties in the same land, each fully officered, and each publishing in official form the opinions of its courts of last resort, bewilder the American lawyer in his search for authority. The guiding principles of our law are few and plain. Their application to the matter we may have in hand, it is the business of our profession to make, and if we spent more time in doing it ourselves, and less in endeavoring to find how other men have done it in other cases, we should, I believe, be better prepared to inform the Court and serve our clients."

It is said in a recent number of the American Law Review that the editor* had heard several New York lawyers of distinction make the complaint that the Court of Appeals of that State shows more and more an inclination to disregard hard and fast rules of law and judicial precedents, and decide cases according to what appears to them the justice of the case as between suitor and suitor; and we are sure, the editor says, that this complaint is going the rounds of the New York bar. He adds that the president of the Washington State Bar Association recently arraigned the Supreme Court of the United States on the same ground; "and no higher tribute," the editor adds, "was ever paid to a court of justice."

Different remedies have been suggested, such as legislative restriction upon the publication of reports, the non-publication of dissenting opinions, or the opinions of other than courts of last resort. But after thorough discussion it was resolved by the American Bar Association that such remedies were impracticable. The Association however declared in favor of the writing of short opinions, especially in cases turning on facts and those not useful as precedents, and doubted the utility in the present state of the law of using decisions of inferior or intermediate courts as precedents.

The doctrine of judicial precedent is only applied by our courts in a qualified degree to decisions of courts of other States. We call them only

*Ex-Judge Seymour D. Thompson.

persuasive authority. So far as the decisions of the same State have become rules of property, the rule of stare decisis rests upon obvious considerations of public convenience and private security. It is also clear that the decisions of inferior tribunals must be controlled by the law as declared by the highest courts of the same State. Under the civil law on the Continent of Europe, superior tribunals are required to put their judgments in writing, and their reasons and grounds therefor, so that the decisions are part of the jurisprudence, but they do not have the element of authority that they have had in our judicial system.

TENDENCY TO CODIFICATION.

But if the authority of adjudged cases is done away with or lessened, it may well be asked wherein our law is to have the certainty which is essential, and how can lawyers advise their clients as to their rights? If every judge is to do that which is right in his own eyes and decide the law, as an eastern Califf sitting at the City's gates, bound by no authority, our last estate would be worse than the first. It is claimed by some that the only remedy for this uncertainty in the law is the reduction of the law to a definite statutory form, that is, in codification.

This does not mean that the whole body of the law ought to be at once reduced to a statutory form, or that judicial construction or development of the law by application to new complications of fact can ever be done away with. Codification in this sense is not a reduction of the unwritten law to a written law, as in the early stages of judicial systems, where customary law was reduced to writing, as in the Twelve Tables of Rome. It is declaring the written law in a more definite, certain and accessible form. Caligula is said to have been execrated in history because he had the laws written in such small characters and posted so high that the people could not read them.

We have what has been termed a tacit codification going on where the principles decided in adjudged cases are so collated that rules are formulated from them which become acknowledged and adopted as a statement of the written law. In this sense the results of codification are in a measure effected by our great text writers, whose works are quoted as authority by the courts. This method of codification, however, is not adequate in this vast accumulation of case law which is now overwhelming us.

There is also a statutory codification pro tanto going on, not only in the different States of this country, but also in England and her self-governing colonies. Every legislative act, which declares the law upon a specific subject, thus declaring a rule of action binding in future cases upon that subject, is insofar codification. It differs from a decision of the court declaring the rule for such a case, as there the court declares not only what is the law for that case and future cases, but also what has been the law for past cases. You have illustrations of this partial codification in your own statutes. This

with some twenty other States have followed the recommendation of the American Bar Association and codified the law of negotiable instruments. Many States have followed a similar recommendation in adopting a uniform form of acknowledgments. An English statute similar to our statute of negotiable instruments has been adopted by England and all of her self-governing colonies. The codification of the law of sales, known as the sales of goods act, was enacted in England in 1893 and has since been extended to Scotland and adopted by Australia and other colonies. You have adopted in Colorado the common law of England by statutory enactment, as we did in Missouri. This was, however, the adoption of the system of jurisprudence to take the place of the civil law, which prevailed in the territory included in the Louisiana purchase when acquired by the United States.

It is not necessary on this occasion to enter upon the discussion of the practicability or advisability of an attempt to reduce all the law of any State to a codified form. It is perhaps better suited to the character of our people, to the gradual development of our jurisprudence, that this process should go on as it is now proceeding in your State and in mine, by the gradual enactment into statutory form of those principles of the law which are definitely established and are thus capable of being reduced to statutory form. Thus Mr. Rose, the late president of the American Bar Association, in an address before the National Conference of the State boards of commissioners for promoting uniformity of legislation in the United States, says, "Whatever difficulties there may be in in the way of codification, and there are many, I think you must always recognize that this is a goal towards which we are inevitably tending. There seems to be no other refuge from the riotous and pandemonium confusion of cases." That this tendency exists is unmistakable. Thus our penal law is codified in all the States. Several States have adopted civil codes, wherein the law of personal relations, real estate, personal property and equity have been codified, as well as the law of action and defenses. Louisiana has had such a code for over sixty years, framed by Mr. Livingston. Georgia has a civil code, and codes more or less complete have been adopted and are in force in North and South Dakota. The codes of the two latter States are really based upon the territorial code made by Dakota before it was divided and admitted into the United States. It is said that this was the first English speaking community to adopt a codification of its substantive law. It was framed by David Dudley Field and his associates in New York, and for the adoption of which in his own State that eminent jurist struggled in vain. His code of procedure, however, was adopted, and has been followed by the great majority of English speaking communities, including England and her colonies. It is declared in the code of North Dakota, section 5147: "The rule of the common law that statutes in derogation thereof are to be strictly construed has no application to this code. This code establishes the law of this State respecting the subjects to which it relates, and its provisions and all the proceedings under it are to be impartially construed with the view to effect its objects and to promote justice."

We cannot but be impressed with the fact that no State which has adopted a code has repealed it and gone back to the system of finding the law in the vast and undigested mass of adjudged cases. As far as we can judge from the expressions reported in the proceedings of the American Bar Association, the lawyers who practice under the codes testify in their favor. (See Reports of American Bar Association of 1885, pp. 70 and 81, and of 1886, p. 47.) On the other hand, it appears from the reports of the States which have adopted codes that their judges study precedents, refer to and apply them, in a manner not materially different from the courts in other States. It would seem therefore that the doctrine of precedent is too deeply rooted in our judicial system to be removed by the mere adoption of a code.

But whatever the objections to codification, the demand for certainty in the law will be irresistible. But even conceding that the tendency is for the reduction of the law to a statutory form, we here face a practical difficulty. The task of reducing the law to a statutory form requires the highest order of legal learning and skill. The codification of the Roman law under Justinian was made by Tribonian, the most learned jurist of the empire, and therefore Gibbon could say: "The vain titles of the victories of Justinian have crumbled into dust, but the name of the legislator is inscribed on a fair and everlasting monument."

So in the great codes of modern times, the French and German codes, Napoleon and the present German Emperor called to this work the most eminent jurists at their command. How different the problem in the self-governing communities, which inherit at once the Anglo-Saxon freedom and the common law. We have no emperors to bring to this task juristic ability, but our statutes are enacted haphazard, and the growing distrust of our legislature leads many to prefer judge-made law, however imperfect and uncertain, to statute law. The popular as well as the professional distrust of legislatures is a grave complication. The great volume of our constitutional law is made up from decisions declaring legislative acts unconstitutional.

The later constitutions of our States contain elaborate and detailed restrictions upon the legislative power, some of them assuming almost the dimensions of a code of statutory law, in the attempt to protect the people against their own representatives. From this same popular distrust of our representatives grows the demand for the initiative and referendum; vain attempts however to remedy the failings of popular government by abandoning the principle of representation which makes such government possible.

THE STUDY OF COMPARATIVE JURISPRUDENCE.

The difficulty which this situation presents in even the gradual codification of the law is indeed a grave one. But it must be met and surmounted as all of the other evils in our body politic and civilization, by the power of enlightened public opinion, and therein lies the duty of our profession and

the usefulness of our Schools of Law and Bar Associations, in directing and educating that public opinion.

This crisis in the development of our jurisprudence involved in the grave discussion of the doctrine of precedent, which has been its characteristic for centuries, and the apparent tendency to a reduction to a statutory form bring to mind the history of that other great system of jurisprudence, the Roman or civil law, which to-day includes not only the Latin and the Scandinavian and Slavonic races and all of the Germanic race except those of Anglo-Saxon descent, and with our common law practically includes the civilized world. That system in its development from the law of the Twelve Tables to the Justinian Code, covering a period of a thousand years, presents features very analogous to the development of our own jurisprudence. The Praetors relieved by their successive edicts the harshness and rigidity of the law of the Twelve Tables, as our Chancellors by their decrees relieved the harshness and rigidity of the common law, although the doctrine of judicial precedent based on adjudged cases was not developed in the civil law as in our own. The doctrine of the jus gentium or the law common to all nations, which was developed by the Roman jurists as distinct from the jus civile or local law of Rome, was really based on the study of what we would call comparative jurisprudence,—the recognition of these fundamental principles of justice which are common to mankind in all systems of law. The Roman law is the great connecting link connecting ancient with modern jurisprudence. It is the basis of the modern French and German codes and of the jurisprudence of all the modern States except the United States and England and her self-governing colonies. Even in Scotland we find a modified form of the civil law, and in the French provinces in Canada we find administered in the French language the French customary law of the last century, under the pledge of England at the time of the conquest of over a century ago, that the people would be protected in their language, religion and law.

Recent archeological investigations have opened to us the jurisprudence of remote ages. We have found in the valleys of the Tigris and the Euphrates, and on the site of the city of Babylon, the tablets, which have been preserved for thousands of years, and which unfold to us the systems of law governing the relations of parent and child, and husband and wife, and the buying and selling of land, practiced in those prehistoric times.

The world has grown distinctly smaller in the last quarter of a century. Steam and electricity have annihilated time and space. The dominant races of the world have assumed the protection of the inferior and less developed peoples. The two great systems of law are thus brought into closer relations. We have in the Philippines a vast population which for centuries had been governed by the Spanish law, based upon the civil law. This will undoubtedly continue to be the law of those islands, administered by our courts, just as the French law has been administered by the English in Canada. With our increasing commercial relations, we are coming more and

more in contact with the civil law in Mexico, in Central America and in South America. Thus we are brought practically to realize the great principles of comparative jurisprudence, the laws common to all men, as the Romans recognized the jus gentium in place of the jus civile, as they became the conquerors of the world.

Mr. James Bryce, the thoughtful student of our own institutions, in his recent studies in history and jurisprudence, (page 122) on the Roman and English Law, says: "The world is, or will shortly be, practically divided between two sets of legal conceptions of rules, and two only. The elder had its birth in a small Italian city, and although it has undergone various changes and now appears in various forms, it retains its distinctive character, and all these forms still show the underlying unity. The younger has sprung from the union of the rude customs of a group of Low German tribes with rules worked out by the subtle, acute and eminently disputatious customs of the Gallicized Norsemen who came to England in the eleventh century. It has been much affected by the elder system, yet it has retained its distinctive features and spirit, a spirit specially contrasted with that of the imperial law in everything that pertains to the rights of the individual and the means of asserting them. And it has communicated something of this spirit to the more advanced forms of the Roman law in constitutional countries."

The progress of the world, he concludes, is towards uniformity in law and toward a more efficient uniformity than is discoverable either in religious beliefs or in political institutions.

The suggestion of Mr. Bryce as to the contrast between the common law and the imperial law in whatever pertains to the rights of the individual and the means of asserting them, is profoundly significant. The common law throughout its history, from the Year Books down, breathes the spirit of individual liberty. Under the common law of America and England there are no official courts for the trial of official cases. "No man," said Justice Miller, "in this country is so high that he is above the law. No officer of the law may set that law at defiance with impunity." The same law applies to all persons and is administered for and against all persons in the courts of law. We may be impatient that reforms move so slowly. We have no emperors to summon great jurists to frame our civil codes. Our system of jurisprudence, like our form of government, has been developed through the slow progress of centuries. In the happy phrase of Mr. Lowell, the framers of our government were not seduced by the fallacy that a new system of government can be ordered like a new suit of clothes, and it is only on the roaring loom of time that the stuff is woven for such a vesture of thought and experience. This is equally true of a code of law. It cannot be framed to order for an Anglo-Saxon people. Law can only be effective when it represents the customs and usages of society, and any reduction of our customary and judicially declared law to a statutory form must be consistent with this fundamental principle. We may say of our country, as Tenny-

son said of the mother country, whence we derived our law and our spirit of liberty:

> "A land of settled government,
> A land of old and just renown,
> Where freedom broadens slowly down,
> From precedent to precedent."

This review of the quarter century would be incomplete without mention of the great progress in international arbitration, in the substitution of rational discussion and arbitration for the settlement of international difficulties. It was a notable event in history, when a few years since the greatest despot in the world made a public appeal to the nations for disarmament. Private warfare has been abolished in the progress of civilization, and may we not hope that the poet's dream may yet be realized for a "parliament of man and federation of the world," and that sound and well defined rules of international law and peaceful arbitration will abolish war, as private warfare has been abolished by the peaceful arbitration of the courts?

There is another form of warfare for which our system of jurisprudence is not yet adequate, and that is the determination of these great industrial controversies which array class against class, and which are not only destructive of business security, but at times threaten the very foundations of social order.

These are the great questions of the future. In the determination of these great problems which confront the future of society, such institutions as your own must realize their greatest usefulness. We must study the science of jurisprudence. Your broad curriculum and your extended course are hopeful signs. Our profession touches human life on every side, as we deal with men in every relation of life. The dreamers who have pictured Utopian and ideal places of existence have found no place for the lawyer, but in the busy practical world he is indispensable as the minister of justice in an industrial civilization. We study the lofty ideals of justice in order that we may apply them in the busy lives of men in the practical affairs of life.

The intense commercialism of our time may tempt the lawyer to forget the noble ideals of his profession. It is true that his position has changed and that the demands upon the profession have changed, as society changes, and new business conditions are developed. The principles of the law may become settled more and more, yet the ever increasing complexity of human life and the new complications of facts developed, must ever require, as time goes on, new applications to these new conditions of the fundamental principles of justice between man and man.

It is the glory of our profession that despite the traditional conservatism which tends to make men cling with veneration to what is old and established in human institutions, from its own ranks have come the leaders in the great reforms which have simplified judicial procedure, redeemed our

law from the reproach of formalism and released it from the shackles of feudalism and barbarism.

May those trained in this institution, so nobly founded in this Centennial State of the Union, ever be inspired by these lofty ideals; may they be the worthy successors of these great leaders in harmonizing our law with an advancing and progressive civilization.

THURSDAY EVENING

THE QUARTO-CENTENNIAL CONCERT.

Presbyterian Church, Boulder, Colo. Thursday Evening, November 13th, 1902, at 8 o'clock. Madame Suzanne Adams, Soprano. Mr. Leo Stern, Violoncello. Mr. John Pierce Langs, Piano.

PART ONE.

Second Rhapsody ..... *Brahms*

MR. LANGS.

Concerto in A Minor ..... *Goltermann*

MR. STERN.

Aria from "Traviata" ..... *Verdi*

MADAME ADAMS.

Berceuse de Jocelyn ..... *Godard*
Le Cygne ..... *Saint Saens*
Dance of the Elves ..... *Popper*

MR. STERN.

Elegie ..... *Massenet*
L'Absence ..... *Fontenailles*

MADAME ADAMS AND MR. STERN.

PART TWO.

Second Polonaise ..... *Liszt*

MR. LANGS.

Du bist wie eine Blume ..... *Schumann*
Als die alte Mutter ..... *Dvorak*
Printemps Nouveau ..... *Vidal*
Coquette ..... *Stern*

MADAME ADAMS.

Melodie Romantique ..... *Stern*
Pastorale ..... *Stern*
Tarantelle ..... *Stern*

MR. STERN.

A Little Thief ..... *Stern*
Snowflakes ..... *Cowen*
The Swan ..... *MacDowell*
Should He Upbraid ..... *Bishop*
La Danza ..... *Chadwick*

MADAME ADAMS.

Arioso ..... *Delibes*
Obstination ..... *Fontenailles*

MADAME ADAMS AND MR. STERN.

FRIDAY MORNING

EXERCISES OF THE SCHOOL OF MEDICINE.

PROGRAMME.

Music. Le Reine de Saba. *Gounod.*
ORCHESTRA.

Invocation.
REV. J. M. WILSON, D. D.

Historical Address.
DEAN LUMAN M. GIFFIN, M. D.

Music—Duet. Jasmine. *Gade.*
MISS ROSETTA G. BELL.
MISS MAY WHITMORE.

Address. The Scientific Aspect of Modern Medicine.
FREDERIC S. LEE, Ph. D.
Adjunct Professor of Physiology, College of Physicians and Surgeons, Columbia University.

ADDRESS BY DEAN LUMAN M. GIFFIN.

As early as 1881 the Regents of the University were considering the advisability of establishing a department of medicine, but not until 1883 did these considerations culminate in the decision to establish at once such a department.

That the ideal of the Regents, while a very commendable one, was in advance of the times is evidenced by the circular of information issued during the summer of 1883. I extract the following from this circular: "If the present evil of two terms of not less than twenty weeks each, now so prevalent, was the basis of the instruction to be given, the people of Colorado might well inquire as to the necessity of more schools of medicine. But such is not the intention. The curriculum is to consist of a four-year graded course of nine months each." The reasons given by the Regents for that length of course, were good at that time and are just as good to-day. They were as follows: "First—A sufficient time is taken for each branch to be taught in a thorough manner without crowding new topics upon the attention before previous instruction can be properly assimilated. Second—It obvi-

ates the necessity for preliminary study under a preceptor, the college being the preceptor."

Had this ideal been insisted upon, it is a question whether any students would have attended the school. It was not insisted upon and later announcements indicate that the Regents appreciated that the ideal four-year course was in advance of the times. Commercialism was too strong in the schools of medicine. Students could see no reason why they should take four years of nine months each, when a diploma could as well be obtained in two years of twenty weeks each. To illustrate the status of medical education at that time one may refer to a sentence in an article by one of the teachers in a large medical school, written at about this period. In substance it was as follows: "Schools must not for a moment think that they are regulating the character and length of their courses. The students are doing this. If one school asks for too long a course, too great preliminary requirements or too careful attention to work, other schools do not, and the students will attend the easier school. You must have students in order to have a complete school and the whole character of your curriculum must be consistent with the student idea." This quotation is not verbatim, it is given from memory of the article, but it illustrates clearly the condition existing at that time in schools of medicine. This also explains the action of the Regents in lessening the number of courses to three and the preliminary educational requirements to what amounted to the reception of any student who applied, not inquiring too closely as to his education. Despite these more liberal plans, the department had its worries. Students did not present themselves in large numbers. The University was poor. The other departments of the University could profitably use the appropriation intended for the department of medicine, and with seven to fourteen students in attendance, it became a question with the Regents as to the advisability of continuing the school of medicine. An annual pilgrimage of the Faculty of the department to the meetings of the board at this time, to show reason for the continued existence of the school, was the regular thing.

Eventually the Regents decided that the department of medicine was upon as solid a basis as any department of the University, and from this time the school prospered in a greater degree.

The first work of the school was done in two west rooms in the third story of the main building. This amount of space was ample for our needs then. We were not crowded nor were the other departments of the University inconvenienced for room. As the department increased in numbers and needs, the present Anatomical building was erected for the use of the school. This building was sufficient for our requirements for four or five years but eventually it became too small for the growing school and then the former hospital was arranged for the work of the department.

In 1892, it was thought best to conduct a portion of the work in Denver. This plan was pursued from this time until the spring of 1897, when urged by the Supreme Court of the State, it was deemed better to conduct all the

work of the department in Boulder. This move necessitated a thorough reorganization of the school. This reorganization was accomplished and since that time the school has been steadily advancing. In 1895 the four-year course was again adopted and is continued to the present time, with no prospect of any lesser course ever being given. In 1900, a preliminary education equal to that given by a first class high school was made requisite for entrance to the department. Our present hospital was erected in 1898 and has served us well for illustrative material.

Dr. J. A. Sewall was the first Dean of the school, acting in that capacity for one year. Dr. J. H. Kimball acted as Dean from 1884 until 1892, but was not given the title of the office. From 1892 until 1896, this position was well filled by Dr. J. T. Eskridge. Dr. Clayton Parkhill was Dean from 1896 to 1897. Since that time the present incumbent has acted as Dean of the school.

The University has conferred the Degree of M. D. upon one hundred and six candidates. We have alumni in twenty of the States, two in Europe and one in Manila. Twelve have passed away. This appears a large percentage but is explained by the fact that many of our students have been invalids when entering the school. Colorado's reputation as a health resort brings us many students who are unable to attend school work in the East.

Of our alumni, nine are engaged as teachers in schools of medicine, six are connected in various ways with military life, as assistant surgeons, or surgeons, and one is surgeon general of his State. Six are connected with railroads as assistant surgeons, division surgeons or chief surgeons. Wherever our alumni have located, with very few exceptions, each one has ranked well as a citizen and also as a physician and surgeon, acting well his part in life.

ADDRESS BY PROFESSOR FREDERIC S. LEE OF COLUMBIA UNIVERSITY.

THE SCIENTIFIC ASPECT OF MODERN MEDICINE.

The origin and development of medical science are contemporaneous with the origin and development of mankind. So long as man has been, so long has been disease; and whenever man has suffered, man has tried to heal. The foundations of medicine lie deep in that soil of common knowledge from which arose all the sciences, and throughout its history it has freely absorbed the discoveries of them all. From the first it has been, and it must ever remain, their common meeting-place. In proportion as its spirit and its methods have been scientific it has progressed toward ultimate perfection. Yet, notwithstanding the importance of science to medicine, from first to last medicine has been permeated by the pernicious influence of empiricism. A wise man once said that all true science begins with empiricism, and medical science is a striking example of this fact. But it made an early

effort to free itself. The most brilliant epoch of Grecian history is marked no more immortally by the wisdom of Socrates, the histories of Herodotus, the tragedies of Aeschylus, and the art of Phidias, than by the medicine of Hippocrates and his followers, for this represents the first recorded endeavor —and a mighty endeavor it was—to break away from the empiricism of the earlier ages. But the science of the time was meagre, and, however laudable the aim, the Hippocratic writings are full of empirical notions. From that time on, down through the ages, we find science and empiricism, like the good and bad principles in all nations and all religions, ever contending. The struggle still continues. As Richard Hooker wrote more than three hundred years ago, so to-day do "empirics learn physic by killing of the sick." The empiricism of to-day is not solely the method of osteopaths, Christian scientists and venders of patent nostrums; it is found in the schools and the practice of legitimate medicine. At times it has surprising successes, yet the struggle is an unequal one and science is sure to be victorious. At no period of the world's history has the scientific idea in medicine been so aggressive and advanced so rapidly as during the past fifty years, and at no time has it seemed nearer its ultimate victory than at this beginning of the twentieth century. This advance is so striking and so full of general interest that I have ventured to choose it as my subject to-day, under the title of "The Scientific Aspect of Modern Medicine."

THE IDEA OF A VITAL FORCE.

One of the most essential prerequisities of this advance was the complete and final liberation of medical science, and of all those sciences now comprehended under the general title of biology, from a burden which in one form or another had hampered progress from the earliest times. I mean the conception that living bodies possess within themselves an active force, or principle, differing in nature from anything possessed by non-living bodies, and which represents the vitality of living things. The beginnings of this idea are found in the various forms of animism of savage races, according to which a spirit or ghost inhabits the body and is responsible for its actions. In diseased states, this good spirit is dispossessed by an evil one. In one form or another this belief is met with among all civilized peoples. It is found in the days of Salem witchcraft, and even as late as 1788, in Bristol, England, when seven devils were exorcised from an epileptic. In physiology from the times of the early Greek medicine until after the Renaissance the animistic idea is represented by the doctrine of the pneuma or the "spirits." In Hippocratic times the spirits entered the body through the lungs, and were carried by the blood to all parts, and enabled the vital actions to take place. At about 300 B. C. the Alexandrians found it convenient to make use of two forms of this mysterious agent, the "vital spirits" residing in the heart, and the "animal spirits" in the brain. To these, in the second century of the Christian era, Galen added a third, the "natural spirits," located in the liver.

All physicians of the present day are familiar with the remarkable story of Galen and his long reign in medicine. Born in the time of the Emperor Hadrian, he lived an active life of medical research and practice. He was the imperial physician of Rome, and while the wise Marcus Aurelius was writing his "Meditations," Galen was producing his numerous medical books. These covered the whole field of the medicine of his time, much of which was the direct result of his own investigations. His activity was unparalleled, his knowledge immense, his logic and literary skill pronounced, and his system of medicine all embracing. In those respects he was far above his contemporaries and with the decline of the Roman civilization, the consequent disappearance of originality of thought, and the long unbroken sleep of research, what wonder is it that his brilliance should shine unrivaled through the dark ages?

For more than a thousand years following his death, his authority in all things medical was supreme, and the doctrine of the pneuma was unchallenged. Only when there came the intellectual awakening of the Renaissance, did men ask themselves whether Galen's books or the human body more nearly represented the truth. But it was even long after this that the pneuma was deposed, and when it fell it was only to give place to the archeus of that arch-charlatan, Paracelsus, and to the anima sensitiva of the mystic philosopher, Van Helmont, and the melancholy pietist, Stahl. Through the latter part of the eighteenth and the early part of the nineteenth century, the vital principle was still in control of the physiologists, but, as they learned more of the conservation and the transformation of energy in inanimate things, and more of the working of living bodies, the gulf between the inanimate and the animate gradually narrowed, and the supremacy of the laws of chemistry and physics in all things living became clearly recognized. It is true that at times in these latter days, sporadic upshoots of a neovitalism raise their tiny heads, but these are to be ascribed to the innate aversion of the human mind to confess its ignorance of what it really does not know, and they do not receive serious attention from the more hopeful seekers after truth.

The elimination from scientific conceptions of the idea of vital force made possible a rational development of the science of physiology, and in this way led directly to the growth of a scientific medicine. In one of his luminous essays, Huxley has written: "A scorner of physic once said that nature and disease may be compared to two men fighting, the doctor to a blind man with a club, who strikes into the melee, sometimes hitting the disease and sometimes hitting nature." * * * The interloper "had better not meddle at all, until his eyes are opened—until he can see the exact position of his antagonists, and make sure of the effect of his blows. But that which it behooves the physician to see, not, indeed, with his bodily eye, but with clear intellectual vision, is a process, and the chain of causation involved in that process. Disease * * * is a perturbation of the normal activities of a living body, and it is, and must remain, unintelligible, so long as we are ig-

norant of the nature of these normal activities. In other words there could be no real science of pathology until the science of physiology had reached a degree of perfection unattained, and indeed unattainable, until quite recent times."

No period has been so rich in physiological discoveries as the last fifty years of the nineteenth century. Research has developed along two main lines, the physical and the chemical, and to-day physiology is rightly regarded as the foundation stone of the science of diseases, and thus as the basis of scientific treatment.

THE CELL DOCTRINE.

At the time when vital force was having its death struggle the cell doctrine was being born. Inseparably linked with the idea of the cell was the idea of protoplasm—protoplasm—the living substance,—the cell the morphological unit. The heretofore mysterious living body was a complex mass of minute living particles, and the life of the individual was the composite living of those particles.

Within the past few weeks the world has bowed in mourning over the bier of an aged man, who more than forty years ago, in the strength of his vigorous manhood, gave to medical science in a well-rounded form the best of the cell doctrine of his time. Rudolph Virchow need have performed no other service than this to have secured worthy rank among the great men of medicine of the nineteenth century, for few books exercised a greater influence over medicine during that period than his "Cellular Pathology." From ancient times physicians had been divided into many camps regarding the causes of disease. One idea had been prominent for more than twenty centuries: The humoralists had maintained that pathological phenomena were due to the improper behaviour or admixture of the liquids of the body, which were, in the original form of this theory, the four humours: blood, phlegm, yellow bile and black bile. According to the solidists, on the other hand, the offending agents were not the liquids but the solids, and especially the nervous tissues. Both humoralists and solidists were excessively speculative, and the growing scientific spirit of the nineteenth century was becoming impatient of hypotheses that could not be experimentally proved. The times were ripe for new ideas. Virchow, soon after taking at Berlin the professor's chair, which he held from 1856 until his death, gave to an audience largely composed of medical practitioners, the lectures which, more than all else, have made him famous among his professional brethren. His main thesis was the cellular nature of all the structures and processes, whether normal or pathological, of all organized beings, and his dictum, "omnis cellula e cellula"—a cell arises only from an already existing cell—is the keynote of his theories. With his microscope he demonstrated the cells in all the tissues of the body, whether normal or pathological, and he proved the origin of the morbid cells in the normal ones. As to processes, he maintained rightly that all parts of the body are irritable, that every vital

action is the result of a stimulus acting upon an irritable part, and he claimed a complete analogy between physiological and pathological processes. Every morbid structure and every morbid process has its normal prototype.

Virchow's ideas aroused enthusiasm the world over, and were eagerly studied, and largely accepted by progressive men of medicine. Time and research have corrected errors of detail, but no one now denies the cellular nature and physiological basis of pathological phenomena. These facts are fundamental to the understanding and treatment of disease, which is now universally regarded as the behaviour of the body cells under the influence of an injurious environment.

Virchow's ideas regarding pathological formations are a fitting complement to the laws of the conservation and transformation of energy. In the living world, as in the non-living, the law of continuity holds good. There are no cataclysms, there is no new creation. Structure and energy, whether normal or abnormal, proceed from pre-existing structure and energy. Only such a conception can make possible a scientific medicine, and, since its promulgation, medical advance has been rapid.

THE RISE OF BACTERIOLOGY.

During the past half century, and largely during the past twenty-five years, that is, during the lifetime of this University, there has grown up a totally new science, comprising a vast literature and a vast subject matter, though dealing with the most minute of living things. This is the science of bacteriology. The achievements in this field have surpassed all others in their striking and revolutionary character, and bear both on the conception of the nature of a very large number of diseases, hitherto puzzling human understanding, and on their prevention and cure, hitherto baffling human skill. All other human deaths are few in number in comparison with those that have been caused by the infectious diseases. Occuring the world over, constantly with us, invading all homes, and keeping the death rate in cities perpetually high, at times they have swept, with the fury of a fiery volcanic blast, over large regions of the earth's surface, sparing few, and leaving in their train empty households and cities of death. Recent statistics have claimed that one of these diseases, tuberculosis, alone kills one-seventh of all the population of the world.

To what are these pestilential visitations due? Many have said: "To the anger of offended gods;" others: "To the displeasure of a divine Providence;" the early physicians: "To a wrong admixture of the humours;" the later pathologists: "To mysterious fermentations." But none of these answers has touched the vital point. This was reserved for a simple, modest, and earnest student of science, of humble origin, the son of a French tanner, a man unhampered by medical tradition, seeking only the truth, and possessed of no genius except the genius of perseverance. To Louis Pasteur, more than to all others, should be given the honor of having solved the prob-

lem of the causation of these dread diseases. He laid the foundations of the new science, broad and deep, with surprisingly few errors of judgment.

It is instructive to look at the leading features of Pasteur's life work. From the beginning of his career, Pasteur was the defender of pure science, yet his work demonstrates well the ultimate practical value of what seems at first purely scientific. At the age of thirty-one he became a professor and dean of the Faculty of Sciences at Lille, and in his opening address he said to his students: "You are not to share the opinions of those narrow minds who disdain everything in science that has not an immediate application." And then he quoted that charming story of Benjamin Franklin, who when witnessing a demonstration of a scientific discovery, was asked: "But what is the use of it?" Franklin replied: "What is the use of a new-born child?"

Pasteur's various scientific labors form a strikingly connected series, each being logically bound to those that preceded it. Beginning with a study of the forms and significance of the crystals of certain salts in which he made use of fermentation processes, he passed directly to the study of fermentation itself. He early appreciated the fact that this phenomenon, due as it is to the presence in fermentable liquids of microscopic living bodies, bears significantly on fundamental physiological processes, and his labors directly established the germ theory of fermentation. Fermentation led to his famous investigation of the problem of spontaneous generation, which for ages had vexed the scientific and popular mind. Organic liquids exposed to air soon become putrid and filled with microscopic beings, the origin of which was a mystery. Many believed them to originate spontaneously; others thought that the air contains a mysterious creative influence. "If in the air," thought Pasteur, "let us find it." And by the simple device of stopping the mouths of flasks of sterilized liquids by a bit of cotton wool, he was able to filter out the influence and keep his liquids pure and free from life. At the end of a year's active work he announced a most important fact: "Gases, fluids, electricity, magnetism, ozone, things known or things occult, there is nothing in the air that is conditional to life except the germs that it carries." His position was assailed by clever men, and he was forced to defend himself. It was here that his power of perseverance first formidably asserted itself. The struggle lasted for years, and Pasteur repelled each attack, point by point, with facts acquired by ingenious experimentation with the ultimate result of giving to the doctrine of spontaneous generation its death blow.

Fermentation and spontaneous generation prepared Pasteur for his next victory. The French wine trade was threatened with disaster. Wines prepared by the accepted methods often became sour, bitter, or ropy. It was said that they suffered from diseases, and the situation was critical. It was Pasteur's achievement not only to prove that the diseases were fermentations, caused not spontaneously but by microscopic germs, but also to suggest the simple but effective remedy of heating the bottles and thus destroying the offending organisms.

It seemed a long step from the diseases of wines to the diseases of silk worms, yet when a serious epidemic, killing the worms by thousands, threatened irreparable injury to the silk industry, it was only natural that Pasteur, with his growing reputation for solving mysteries by the diligent application of scientific method, should be called upon to aid. He responded with his customary enthusiasm, and for five years diligently sought the cause of the trouble and the cure. Though stricken by paralysis in the midst of his work, in consequence of which for a time his life hung in the balance, in three months he was again in his laboratory. Here, as in his previous labors, he achieved final success. He proved that the silk worms were infested with two distinct diseases, pebrine and flacherie, each of which was due to its specific germ, protozoan in the one case and bacterial in the other. Furthermore, he devised efficient methods of eliminating both diseases, and thus relieved from its precarious condition the silk industry of France and of the world.

By the year 1870 Pasteur's success had already assured him, at less than fifty years of age, a commanding place in the scientific world. His demonstrations of the all-important parts played by microscopic organisms in the phenomena which he had studied, had stimulated widespread investigation. He had already dreamed of the germinal nature of human diseases, and now medicine, which had long suspected them to be associated with fermentation processes, began to appreciate the significance of the new discoveries. In 1873 he was elected to fill a vacancy in the French Academy of Medicine, and from that time on he gave attention more exclusively to pathological phenomena. He investigated septicaemia, puerperal fever, chicken cholera, splenic fever, swine fever, and lastly rabies. To speak at length of what he accomplished in this field would require much time. I would, however, mention one salient incident.

One day chance revealed to him a unique phenomenon, the further study of which led to one of his most significant discoveries. In the inoculation of some fowls with chicken cholera, not having a fresh culture of the germs, he used one that had been prepared a few weeks before. To his surprise the fowls, instead of succumbing to the resultant disease, recovered, and later proved resistant to fresh and virulent germs. This was the origin of the pregnant idea of the attenuation, or weakening, of virus, which nearly a hundred years before Jenner unknowingly had demonstrated in his vaccination against small pox, and which had been employed by physicians in all the intervening time. By various methods of attenuation Pasteur succeeded in producing vaccines from the virus of several diseases, and he perfected the process of vaccinating animals and thus protecting them from attacks of the diseases in question.

The story of Pasteur's brilliant investigations of hydrophobia is too recent and too well known to relate here. They form a fitting ending to a life rich in scientific achievement, stimulating to research, and momentous in the history of scientific medicine.

In the summer of 1886 it was my good fortune to spend a few hours in the presence of this man in the rooms of the then newly organized Pasteur Institute in Paris. It was in the early days of the practical application of the results of his long-continued, devoted experimentation regarding the cause and treatment of hydrophobia. In a large room there was gathered together a motley company of perhaps two hundred persons, most of whom had been bitten by rabid animals. Men, women and children, from the aged to babes in the arms of their mothers, richly dressed and poorly dressed, gentle folk and rude folk, the burgher and the peasant; from the boulevards and the slums of Paris, from the north, south, east and west of France, from across the channel in England, from the forests and steppes of Russia where rabid wolves menace, from more distant lands and even from across the seas—all had rushed impetuously from the scene of their wounding to this one laboratory to obtain relief before it was too late. All was done systematically and in order. The patients had previously been examined and classified, and each class passed for treatment into a small room at the side: first, the newcomers whose treatment was just beginning; then, in regular order, those who were in successive stages of the cure; and, lastly, the healed, who were about to be happily discharged. The inoculations were performed by assistants. But Pasteur himself was carefully overseeing all things, now assuring himself that the solutions and the procedure were correct, now advising this patient, now encouraging that one, ever watchful and alert and sympathetic with that earnest face of his keenly alive to the anxieties and sufferings of his patients, and especially pained by the tears of the little children, which he tried to check by filling their hands from a generous jar of bon-bons. It was an inspiring and instructive scene, and I do not doubt that to Pasteur, with his impressionable nature, it was an abundant reward for years of hard labor, spent partly in his laboratory with test tubes and microscopes, and partly in the halls of learned societies, combating the doubts of unbelievers and scoffers, and compelling the medical world to give up its unscientific traditions and accept what he knew to be the truth.

MODERN SURGERY.

The earliest practical application to human disease of the results of Pasteur's labors was made in the field of surgery. The horrors of the early surgery had been largely eliminated by the discovery of the anaesthetic effects of chloroform and ether, and the possibility of their safe employment with human beings. But the successful outcome of an operation was still uncertain. No one could foretell when the dreaded septic blood poisoning might supervene and carry off the patient in spite of the most watchful care. Many hospitals were only death traps, the surgical patient who was taken to them being doomed to almost certain death. The suffering of the wounded in our Civil war was extreme, and during the Franco-Prussian war, the French military hospitals were festering sources of corruption,

their wounded dying by thousands. To Pasteur, who realized only too well that the cause of death lay in the germs which were allowed to enter the wound from the outside, this unnecessary suffering and death of so many brave French youths was a source of intense grief. Yet, notwithstanding his protestations and the urging of his views upon those who were immediately responsible, little good was then accomplished, for the French surgeons were slow to adopt new ideas.

In England Lister was more successful. Fired by Pasteur's discoveries regarding fermentation and putrefaction, he conceived the idea of using carbolic acid in the vicinity of the wound while an operation was being performed, for the purpose of destroying whatever germs might be floating in the air or adherent to the surfaces. This was employed successfully, and at once the mortality of surgical operations was greatly diminished. This was the beginning of the aseptic surgery of the present day, and, in the light of what it has accomplished, Lister's achievement shines with brilliance. Carbolic acid was soon discontinued, owing to more efficient aseptic agents and methods of absolute cleanliness, but the essence of the modern surgical method is the same as at first, namely, to prevent the living germs from entering the wound. Septicaemia and pyaemia are no longer to be dreaded, the successful outcome of surgical procedure is practically assured, and operations that were undreamed of twenty-five years ago are now daily occurrences in the hospitals of the world. The most remarkable are those that come under the general head of laparotomy, which requires the opening of the abdominal cavity, and those performed on the brain. It may be said that the greatest development of scientific or aseptic surgery has occurred in America. Here the typical American traits of ingenuity, independence and courage have borne good fruit.

DISEASE GERMS.

Pasteur's work was epoch-making. Apart from its revolutionizing the methods of practical surgery, it has revolutionized our conception of the nature and the mode of treatment of the whole group of germ or zymotic diseases, and has gone far toward solving a host of long-existing and puzzling problems of general pathology. The actual discovery of the germs of human diseases and the proofs of their specific morbific properties did not fall within Pasteur's province. Such achievement has been the lot of others, most brilliant among whom is undoubtedly Robert Koch. The bacillus of anthrax, or splenic fever, was seen in 1838 by a French veterinarian, named Delafond, but its part as the causative agent of the disease was first shown by Koch in 1876, this being the first conclusive demonstration of the production of a specific human disease by a specific bacterium. Think how recent was this event, so significant for the development of a scientific medicine and for the welfare of the human race! Koch's demonstration was made but twenty-six years ago, eleven years after the close of our Civil war. But it was only after repeated subsequent experiments and the piling of

proof on proof by Koch, Pasteur, and others, that the new idea was generally accepted. Since then discovery has followed discovery, and the world watches eagerly for each new announcement. Koch acquired new laurels by demonstrating in 1882 the germ of tuberculosis, and in 1884 that of the terrifying Asiatic cholera. In 1884, also, Klebs and Loeffler found the bacillus of diphtheria, and several investigators that of tetanus. The year 1892 revealed the bacillus of influenza, and 1894 that of bubonic plague. Besides these instances, the part played by specific germs in many other diseases has already become recognized. Small pox, measles, hydrophobia, and yellow fever still defy the investigators, but no one doubts their germinal nature.

But scientific medicine is not content with describing species of bacteria and proving their connection with specific diseases. It must show what these organisms do within the body, how they cause disease, and by what procedure their evil activities may be nullified. Persistent and devoted research has already thrown much light on these problems, yet so much is still obscure that it is difficult to generalize from our present knowledge. The germs find lodgment in appropriate places, and proceed to grow and multiply, feeding upon the nutrient substance of their host. In certain diseases, if not in all, their activities result in the production of specific poisonous substances called toxins, which being eliminated from the bacterial cells, pass into the cells of the host and there exert their poisonous effects. These effects vary in detail with the species of bacterium; and thus the individual, suffering from the behavior of his unwonted guests, exhibits the specific symptoms of the disease.

PREVENTIVE MEDICINE.

In looking over the history of the search for a means of cure, one is struck by the great value of the ounce of prevention. Keeping the germs out is in every way preferable to dealing with them after they have once entered the body. This fact scientific medicine is impressing more and more deeply on the minds of public authorities and the people, and their response in the form of provisions for improved public and private sanitation is one of the striking features of the social progress of the present time. All the more enlightened nations, States, and cities of the world possess organized departments of health, which, with varying degrees of thoroughness, deal with the problems presented by the infectious diseases, in the light of the latest discoveries. Water, and milk and other foods, are tested for the presence of disease germs, cases of disease are quarantined, and innumerable provisions, unthought of fifty years ago, are now practiced daily for the maintainance of the health of the people.

In the city of New York the Department of Health now undertakes, free of charge, examinations for the diagnosis of malaria, diphtheria, tuberculosis, typhoid fever and rabies. It treats all cases of rabies by the Pasteur method free of charge, and it supplies, at slight cost, diphtheria anti-

toxin and vaccine virus, besides mallein to aid in the diagnosis of glanders in horses, and tuberculin for similar use with suspected tuberculosis in cattle. Moreover, from time to time it issues circulars, intended for the education of physicians regarding the causation of infectious diseases and the newest methods of treatment; and through its officers and other physicians and by means of printed matter it endeavors to educate the people in matters of private sanitation. It requires official notification by public institutions and physicians, of all cases, not only of the epidemic diseases, but even of tuberculosis. The benefits derived from these various prophylactic measures are seen in the great decrease in mortality from the diseases in question. Much good is expected from the work of the newly organized Committee on the Prevention of Tuberculosis of the Charity Organization Society of New York, which backed by financial resources, is about to undertake an active campaign to lower the death rate from this particular disease, and to lessen the suffering and distress attributable to it.

Fifty years ago the term, preventive medicine, was unknown. To-day it represents a great body of well-attested and accepted principles. It has cleaned our streets, it has helped to build our model tenements, it has purified our food and our drinking water, it has entered our homes and kept away disease, it has prolonged our lives, and it has made the world a sweeter place in which to live.

SERUM THERAPY.

But if the ounce of prevention has not been applied or has failed, and the bacteria have forced an entrance into the body, what can scientific medicine do to cure? Two things are possible—the destruction of the destructive germs, and the neutralization of their poisonous toxins. The commonly recognized drugs here prove inefficient for the simple reason that the amount of the drug sufficient to kill the bacteria is so great as to endanger the life of the patient. The most promising line of treatment has been suggested by the results of a study of the mutual relations of the bacteria and their hosts. Here again there are many gaps in our knowledge. It is not surprising that the cells of the body resent the intrusion of the barbaric horde of micro-organisms, with their poisonous off-scourings. The cells are roused to unwonted activity, and pour forth into the blood specific substances, which, in many cases at least, seem to be of two distinct kinds, the cytolysins and the antitoxins. Of these, the cytolysins are destructive to the invading bacteria, while the antitoxins are capable of neutralizing, though in a manner not wholly clear, the toxic products of bacterial growth. Cytolysins oppose the bacteria, while antitoxins oppose the bacterial toxins, and the outcome of the disease depends on the relative efficiencies of the contending forces. If the invaders prove too powerful for the body cells, the individual succumbs; if the defenders prevail, he recovers.

With the picture of this natural conflict before the mind, medical science asked: "Is it not possible to aid the invaded body by providing it

with weapons of the same kind as its own, but in larger quantity?" This question medical science has answered emphatically and affirmatively in the case of two serious diseases, diphtheria and tetanus, or lockjaw. By making a pure culture of their germs, and injecting their toxin into the bodies of animals, it can obtain a blood serum heavily charged with antitoxin. This, when injected into the diseased human body, supplements the antitoxin there found, and by so much the patient is aided in his struggle. With both these diseases the success of the serum treatment has been pronounced. A recent study of 200,000 cases in which the antitoxin of diphtheria was used, shows the fatality from that disease to be reduced from 55 to 16 per cent. The problems presented by other infectious diseases seem to be more difficult. What seems to be required in most cases is a serum containing in quantity rather the cytolytic than the antitoxic substance, and as yet an efficient serum of this nature has not been found. Any day may yield such an one. But the matter of the relation of cytolysins and antitoxins and their respective efficiencies in specific diseases needs much elucidation. Serum therapy is in its infancy, but its methods appear so rational that it seems destined to develop into a most efficient branch of scientific medicine.

Second only in importance to the cure is the prevention of a future attack of the disease, or, in other words, the conferring of immunity on the individual. The disease itself, when running its natural course within an individual, confers a natural immunity against a subsequent attack, and with many diseases this may prove to be a life-long protection. Typhoid fever and small pox, for example, rarely attack the individual a second time. In its present state the serum treatment also accomplishes immunity in some, though slight, degree, but greater and more lasting efficiency is desired. Probably no problem in bacteriology is being attacked more vigorously and more widely at the present time than this. A suggestive hypothesis by Ehrlich as to the chemical relations of the invading cells and the cells of the body, has stimulated investigations in many laboratories, and both the nature of immunity and the best method of accomplishing it, which have puzzled medicine so long, bid fair to become known in the near future. With this achieved, preventive medicine will have gained one of its greatest triumphs.

A word should here be said regarding two of the infectious diseases whose peculiar method of transmission, long a mystery, has now become known. I refer to malaria and yellow fever. The able work of Laveran, Manson, Ross, Grassi, Koch and others on the former, and that of Reed and other courageous Americans on the latter, have demonstrated conclusively that these diseases are transmitted from man to man through the aid of the mosquito, which, receiving the germ from an infected individual, cultivates it within its own body and later delivers it in a properly prepared form to another unfortunate human being. Moreover, it is entirely probable that this is the sole method of the transmission of these diseases. The ounce

of prevention here consists in: first, eliminating from the community, so far as possible, the breeding places of the mosquito; secondly, totally preventing, by simple screens, the access of the insect to each case of the disease. By the employment of these simple methods in Havana, during the year ending with the end of last September, not a single case of yellow fever originated within the city, an event unparalleled in recent times. The active work now being carried on by the Liverpool School of Tropical Medicine on the west coast of Africa bids fair to reduce materially the extent of malarial fever, so long the scourge of that region.

It is impossible to predict the full outcome, in the long future, of the diligent research of the past few decades in the field of the infectious diseases. Certain it is, that in civilized countries there appear no more the terrible epidemics of the past, such as the Black Death, which, in the fourteenth century, ravaged much of the continent of Europe, and in England swept away more than half the population of three or four millions. The struggle for existence of the deadly germs is becoming daily a more desperate one. Just as palaeontology has revealed numerous instances of the annihilation of once flourishing species of organisms high in the scale, it is perhaps not visionary to look forward to the ultimate extinction of these more lowly forms, and, with them, to the abolishment forever from the face of the earth, of the diseases which they cause.

The study of the micro-organisms in the past and present bears upon a much wider range of subjects than the immediately practical one of the prevention and cure of individual diseases, however important that may be. It is constantly aiding, in ways surprising and unforeseen, in the solution of even long-standing and remote problems. I need only mention here that of the recognition of human blood as distinguished from that of lower animals. Moreover, this study has helped in the elucidation of many of the fundamental problems of protoplasmic activity, and has given men of medicine a broader culture and a higher outlook over the accomplishments and possibilities of the human organism. This cannot fail to react upon other fields than that of the infectious diseases, to make treatment in general a more rational matter than it has ever been, and to uplift the whole of medicine.

Before leaving this subject finally, I would speak of the many instances of personal heroism exhibited by the men who have labored in this field. The records teem with stories of those who, recognizing more fully and intelligently than others the dangers that surrounded them, the deadly risks they were incurring, have, nevertheless, led by their great courage and scientific devotion, gone steadily forward, sometimes to death itself. There is danger in the laboratory and the hospital, and greater danger in the midst of epidemics. "What does it matter?" replied Pasteur when his friends spoke of these perils. "Life in the midst of danger is the life, the real life, the life of sacrifice, of example, of fruitfulness," and he continued his labors. The death from cholera of a devoted and much loved pupil of his at Alexan-

dria, whither he had voluntarily gone to investigate the dread scourge in 1883, was a great grief to the master, but only intensified his devotion to his work. Since then many others have met an end as heroic—martyrs to the cause of medical progress. Among these I need only mention our own Lazear, who gave up his life in the yellow fever laboratories in Cuba. Notwithstanding such tragedies, the laboratories and hospitals are always full of workers, and each new epidemic finds those who are eager to go to the scene and aid. The good to be performed and the honors to be won overcome the fears, and the ranks of laborers in this most deadly province of scientific medicine are never wanting in men.

INTERNAL SECRETION.

Leaving the subject of the infectious diseases, let me turn now to a mode of treatment based on recent experimental work, and applied successfully to certain unusual and grave maladies, which are evidently accompanied by disordered nutrition, but the cause and proper treatment of which were obscure until very recently.

About a dozen years ago the phrase "internal secretion" began to be employed in physiological laboratories for the first time and for a newly recognized function of glandular organs. It was well known that glands receive from the blood raw material and manufacture from it specific secretions, which are discharged either outside the body for excretion, as is the case with the perspiration, or to the surface of mucous membranes for use in bodily function, as instanced by the gastric juice. It was discovered, however, that certain glands, such as the thyroid, the suprarenal, the pancreas, and others, manufacture and return to the blood specific substances, differing with the different glands, but of important use to the body, and the absence of which leads to profound consequences. These substances were called internal secretions. Thus, removal or suspension of the function of the thyroid gland, and hence the loss of its internal secretion, reduces the body to a serious pathological state, long recognized by the name myxoedema. Of similar causation is the peculiar condition, called cretinism, which is characterized by a physical and mental stunting of the growing individual. The rare Addison's disease is associated with disturbance of the function of the suprarenal glands; and other instances might be mentioned. It seemed a simple step from the discovery of the cause to the discovery of a cure. If absence of a substance is the cause of a disease, supplying that substance ought to effect a cure, and such was found to be the case. Administering to the afflicted individual the fresh thyroid gland of animals, or a properly prepared extract of such gland, was found to alleviate or cure myxoedema, and other instances of the efficiency of glandular products were recorded. So striking were the facts that active investigation of the matter was undertaken, with the result of showing that the chemical interrelationships of the various tissues of the body were profound, and a knowledge of them of exceeding value to the physician. As an instance of this may be

mentioned the fact, recently discovered by Professor Herter of New York, that the suprarenal gland, by means of its internal secretion, controls the manufacture of sugar by the cells of the pancreas, a fact bearing significantly on the causation and the treatment of diabetes. There is need of much research in this field of the internal secretions, but already glandular extracts have proved a valuable addition to the remedies of the scientific physician.

BRAIN SURGERY.

I have already spoken of the entire change in the methods of general surgery during a period of twenty-five years, owing to the rise of bacteriology. But I ought to mention specifically the remarkable advance made during the same time in the surgical treatment of diseases of the central nervous system, the brain and spinal cord, for it is here that the scientific method has achieved one of its most complete triumphs.

Although it was pointed out by the French surgeon, Broca, as early as 1861, that the loss of the power of speech is associated with disease of a certain portion of the left hemisphere of the brain, it was still the general belief that the acting brain acts as a whole. This idea prevailed until 1870, when the German physiologists, Fritsch and Hitzig, demonstrated that stimulation of different areas of the cerebral surface evoke in the body different movements. This was the beginning of the experimental investigation of cerebral localization, a line of research which has proved rich in results. The brain is not one organ acting as a whole, but an association of many organs, each with its specific duty to perform, but intricately associated with all the others. In the years that have passed since the discovery of Fritsch and Hitzig it has been the task of neurologists to discover the functions of the different parts of the central nervous system, to unravel their intricate interconnections, and to associate the disturbance of their functions with external symptoms in the individual. As a result of this labor the neurologist after a careful study of his patient now says to the surgeon, "Cut there, and you will find the disturbing agent;" and the brilliant success of the brain surgery of the present day justifies its scientific basis.

THE NEW PHYSICAL CHEMISTRY.

In the early part of this address I spoke of the freedom with which medicine made use of discoveries in other sciences than its own. A very recent and striking illustration of this is that of the application of the principles of the new physical chemistry to the phenomena of the living body. From the standpoint of physical chemistry the body may be regarded as a mass of minute particles of semi-liquid living substance, the protoplasmic cells, each surrounded by a thin, permeable membrane, the cell-wall, and bathed externally by the circulating liquids, the blood and lymph. Both the protoplasm and the external liquid contain substances in solution, and whatever passes between them, be it food, or waste, or drug, must pass in

the form of a solution through the intervening cell-wall. The laws of solutions and the laws of the passage of solutions through membranes must hence find their applications in the body. It has been the general belief that when a substance becomes dissolved its molecules remain intact, and are merely separated from one another by the water or other solvent. Quite recently physical chemistry has shown that this view is not altogether correct, but that a varying amount of disintegration takes place, a dissociation of the molecules into their constituent atoms or groups of atoms. Moreover, these dissociated particles, ions, as they have been called, are charged with electricity; some, the kations, charged positively; others, the anions, negatively. Electrolytic dissociation is much more pronounced in solutions of inorganic than of organic substances. In proportion to its extent specific properties are conferred on the solutions. What these properties are is not altogether clear, but it is entirely probable that the specific properties of many drugs are dependent, in part at least, on the amount of their dissociation when in solution. Furthermore, the amount of a given substance which is able to pass through a membrane is measured by the so-called osmotic pressure of the substance, and this, which varies with the concentration of the solution, seems to depend on the movements of the molecules and the ions within the liquid solvent. Since the physician, in the giving of a drug, wishes to induce certain cells of the body of his patient to absorb certain quantities of the drug, it is obvious that a knowledge of the principles by which substances pass through membranes will aid him.

The laws of solutions and the laws of osmosis still remain largely obscure, and because of this the literature of the subject contains much that is of little value—deductions from insufficient data, conclusions of one day which are overthrown by the researches of the next, fantastic imaginings which only throw discredit on the really worthy, and hopes buoyed up by the light of an ignis fatuus. But enough of truth has been already revealed to stimulate active research for the sake of physiological progress, and to show that the subject bears profoundly on the problems which the physician meets daily. It is partly along this line that the revitalized science of pharmacology, the study of the physiological action of drugs, which for several years has been actively pressing to the front, promises to make still more rapid progress in the near future.

MEDICAL SCHOOLS.

The growth of scientific medicine, some of the features of which I have thus tried to present to you, has reacted powerfully on our medical schools. The prominent features of this reaction are: The increase in the requirements for admission, the increase in the amount of laboratory and clinical instruction, the extension of the course in length, and the inclusion of the medical schools within universities.

Within a few years the requirements for admission to medical study have been raised from an elementary education, by many schools, to that

of a high school course or college preparation, by a few to a partial college training, and by two to a full college course with a resulting bachelor's degree. As the wisdom of the latter is still not generally conceded, it is doubtful whether in the early future it will become widespread. Ideal as it seems, the one argument against it, that thereby the young man is forced to delay entrance to his life-work until a late age, has never been satisfactorily answered. President Butler's recent pronouncement in favor of a division of the college work into a two-year and a four-year course has much in its favor. This would allow a reasonable amount of those studies which are pursued for the purpose of general education and culture, and a grounding in the especially necessary chemistry, physics and biology.

The increase in the amount of laboratory and clinical instruction is merely in harmony with the truth that seeing is believing. "Study nature, not books," said Agassiz, and he might have added for the guidance of the teacher, "Weary not your pupils with words, let them see things."

In length the medical course has rapidly increased from two to three and from three to four years. With the increase in the number of hospitals throughout the land and the opportunities offered therein to recent graduates to serve as internes under competent visiting physicians, one or two years may be added to the student's equipment, making a training of five or six years before the young doctor actually begins independent practice.

The inclusion of the medical schools within universities is one of the most important advances of medical education made in many years. Of the one hundred and fifty-six schools existing in this country seventy-four, or nearly one-half, are departments of colleges or universities. In this respect, however, America is still far behind Germany, for in the latter country no medical school exists except as a part of the larger institution. The advantages of such a connection are too obvious to dwell upon. Apart from the material benefits that are likely to accrue to the school, and the prestige granted it in the educational world, there is the atmosphere of a broader culture, a more scientific spirit, and less utilitarianism, which is breathed by instructors and students alike and which cannot fail to make the graduates larger men. In the larger of these university schools a portion of the teaching body consists of men who do not engage in medical practice, but, like the instructors in the non-professional schools of the university, give their whole time to their specialties, in teaching and research. Usually these are the holders of the chairs of the non-clinical, basal sciences, anatomy, physiology, pathology, bacteriology, physiological chemistry and pharmacology. The outcome of this must be to broaden and deepen the scientific basis of medicine. The clinical branches are still taught by men who are at the same time private practitioners. In a recent thoughtful essay on "Medicine and the Universities," a professor in one of our leading medical schools urges the further severance of medical teaching and private medical practice. He would have internal medicine, surgery, obstetrics, and, indeed, all the principal clinical departments of instruction, placed, like the

fundamental sciences, "on a true university basis," by which he means that the holders of these chairs should devote all their time and energy to teaching and research. This would require the paying of large salaries and the building of extensive university hospitals, wherein the professors could carry on their investigations. In my opinion the benefits that would thus accrue to scientific medicine far outweigh the arguments that may be brought against so radical a change, and, notwithstanding its highly idealistic character, in view of the present unparalleled generosity of private wealth in endowing scientific research, the present rapid and sure progress of medicine, and the intimate connection of medical advance with the interests of all classes, I look forward confidently to the future establishment of our medical schools on a basis more nearly parallel with that of the non-professional school of the university.

What now as to the future of medical science? With the impetus which it has received from the mighty strides of the past twenty-five years, its future progress and future great achievements are assured. But it behooves us in whose hands lies the training of the physician, to see that he enter on his work with a full realization of his responsibilities. The future of scientific medicine lies with the university. "Though the university may dispense with professional schools," said President Wilson in his inaugural address at Princeton a few days ago, "professional schools may not dispense with the university. Professional schools have nowhere their right atmosphere and association except where they are parts of a university and share its spirit and method. They must love learning as well as professional success, in order to have their perfect usefulness." The perfect usefulness of the professional school consists, not merely in teaching our embryo physician how to destroy bacteria, to remove tumors, or to calm the fire of fevers. These things he must understand, and these he must do daily for the suffering individual. But beyond these are larger tasks. The physician's should be a life of service and of leadership combined. He serves well when he relieves suffering; still better, when he teaches men how to live; but he serves best of all, when he pushes out into the unknown and makes medical science the richer for what he contributes to it. The knowledge of wise men, the deeds of diligent men, and the valor of heroes are the gift of those who have preceded him. Let us see to it that he pass on this heritage augmented, to those who follow.

FRIDAY AFTERNOON

EXERCISES OF THE SCHOOL OF APPLIED SCIENCE.

PROGRAMME.

Music. Melody in F. *Rubinstein.*
ORCHESTRA.

Invocation.
REV. E. W. SIBBALD, B. A.

Historical Address.
DEAN GEORGE H. ROWE, B. S.

Music—Vocal Solo. Dors, mon Enfant. *Wagner.*
MISS ROSETTA G. BELL, Ph. B.

Address. The Potency of Engineering Schools and their Imperfections.
DUGALD C. JACKSON, C. E.,
Professor of Electrical Engineering, University of Wisconsin.

ADDRESS BY DEAN GEORGE H. ROWE.

In the eighth biennial report of the Regents of the University of Colorado, which appeared in 1892, will be found the following statement: "It is apparent that the growing needs of Colorado and the future of the University demand a department which already exists in most state universities. By the addition of one special professor, work in Civil and Electrical Engineering can be begun at once. In due time we shall aim at Mechanical as well as Civil and Electrical Engineering. The courses will be four years in length, and the college standard of admission will be required. There is no purpose to cover the ground of Mining and Agriculture, since those departments already exist as separate schools in the State. We believe that this school will become an important department of the State University."

Accordingly, in the fall of 1893, there were erected on the eastern edge of the campus, the four walls and tin roof of a one-story structure, which with the schedule of courses in the catalogue served to represent all there was of the Engineering School. Courses in Civil and Electrical Engineering were announced, the former to be directed by Professor Henry Fulton, who was also appointed Dean. The Electrical work was in charge of the

Professor of Physics. Both of these men met with and were a part of the college faculty until 1895, when the Engineering School was separated from its literary environment and given a separate organization.

A one-story wing was added to the south side of the original structure in 1895, and used for a time as a gymnasium. After the completion of the present gymnasium, the wing became available as a shop for tool and bench work. The work done in this shop furnished that part of mechanical engineering required for electrical engineering students, and was, moreover, a start toward the future department of mechanical engineering. The second story of the Engineering Building was completed and the building dedicated in 1898. It has furnished sufficient space for several years for shops, laboratories, lecture and drawing rooms, but is quite too small to accommodate the one hundred and twenty students at present enrolled.

The death of Dean Fulton occurred last year. He was thoroughly identified with the work of the school and will be remembered by all. In the latter part of the year his successor, Professor Charles Derleth, Jr., was appointed to the chair of Civil Engineering, and later in the year formal announcement was made of the establishment of the department of Mechanical Engineering and of the appointment of a Professor of that branch. The three departments are now complete and the prophecy of ten years ago has been fulfilled.

The history of the early struggles and rapid growth of the Engineering School of this State reads much like that of all other State Engineering Schools. Apparatus accumulates year after year in direct ratio to the wealth of the State and the generosity of the legislators. In the building up of a school, as in the overcoming of any other form of inertia, there is required what sometimes appears to be a useless expenditure of energy. But we may be sure of the ultimate value of the energy which is now being expended. The Faculty must have in view not only the present but also the future.

It has always been the aim to make all courses conform to the most modern ideas of engineering education, to imitate the good and eliminate as far as possible the many objectionable features of older schools. The wishes and nopes of the Faculty in this regard have been realized to a large extent. The School has been quite as successful as we could expect, and the graduates have been well equipped for their life work. It has been said that the reputation of a school depends on its Faculty and its graduates, all others connected with it being of secondary importance. Certainly the part played by the graduates is a great one. It is with much pride that I speak of these men who have gone from us into practical work. It is the earnest endeavor of the engineering Faculty to keep in close touch with them, that we may be of mutual assistance.

To other engineers of the State, I wish to express hearty appreciation for their interest and assistance in the past and to ask a continuance of their support, encouragement and advice in order to render efficient a school

to which they give indirectly pecuniary support. Also, with parents and guardians of undergraduates, and with other friends of the school, we wish to co-operate for the good of the student.

ADDRESS BY PROFESSOR DUGALD C. JACKSON, OF THE UNIVERSITY OF WISCONSIN.

THE POTENCY OF ENGINEERING SCHOOLS AND THEIR IMPERFECTIONS.

It is natural at a time like this to revert in thought to the teaching of engineering in the technological schools of the country, and to ponder on the influence which this teaching produces upon their pupils and upon the economic welfare of the land. I have assumed that some consideration of this question will interest my audience to-day. A discussion of the potency in the body politic of engineering education is particularly appropriate before the school of applied science located under the inspiring heights of your majestic mountains, which afford an unrivaled richness to him who attacks their depths with efforts properly directed by science. Applied science gives you the power of reaching your ore, hoisting, treating, and finally smelting it,—applied science, which has been taught here and elsewhere, to the chemists and engineers of your rugged State.

I am the more ready to discuss this theme here in the inspiring presence of your mountains and their bracing atmosphere, because you have laid the foundation for, and have the opportunity to build up, a school of applied science (an engineering school) that may stand unexcelled amongst its eastern brethren. True, you are far from the centers of dense population; but the hum of industry is about, and great works are yet to be accomplished before the wealth of your State reaches its highest development; and the engineering school numbering 500 students may be as great as the school that numbers 1,500.

In the building up of your school of applied science, in this, your University, your people must remember that men and money are required. Men who are practiced, and, if possible, great, in two professions,—the professions of engineering and of teaching. Money is requisite to pay for the services of these men and much money for the equipment of laboratories in which they may adequately teach their students—the sons of your State and of its neighbors. In following my remarks please remember that I bear no mission of instruction to this University or its School of Applied Science; but I make a plea and an explanation to those, not technically informed, who are friends of the University and who do not fully understand but desire to know from whence spring the peculiar advantages of technological education and the requirements which demand particularly large expenditures for its adequate support.

During the course of two decades, we as a people have rapidly advanced toward an appreciation of the proper relations of the engineer to his surroundings. The true conception of engineering may be accepted as comprised within the good old definition, "Engineering is directing the sources of power" (and wealth) "in nature to the use and convenience of man." The man who with fullest success follows the profession defined by this keenly conceived sentence must be a man of science, a man of the world, a man of business, and a man who is well acquainted with the trend of human civilization and human aspirations. To make such a man, requires the highest thought and effort of the best teaching influences.

Michael Faraday, one of the magnificent men whose lives have been dedicated to the commands of pure science, said that it requires twenty years to make a man in physical science, the intervening period being one of infancy. How much more effort must be carefully expended to make a man not only in physical science, but a man in business and a man in sociology, all in one! Such men are all of the great engineers, according to their time; and to them ought to be accorded in their youth the most careful training.

Our engineering college men at their graduation should properly be looked upon as apprentices in the engineering profession. The student must be inspired in college and taught to work for himself in the manner adopted by George Stephenson, when instructing his assistants and pupils. "Learn for yourselves," said he, "think for yourselves, make yourselves masters of principles, persevere, be industrious, and there is then no fear of your success." The students should become thinkers in college, capable of usefully applying their scientific knowledge therein obtained; and they should be expected to become thorough engineers through experience in applying this knowledge in a manner which may only be gained in an apprenticeship in the industries, similar to the office and hospital apprenticeships of rising young lawyers or doctors.

The methods used at West Point and Annapolis in training officers for the army and navy, and the course of the graduates after leaving those academies fairly illustrates my point. It is there held that "a man, to know how to teach another man to pull a stroke oar, must get on the stroke oar himself; to be safe as a quarter-deck officer, to give orders for reefing a topsail in a gale of wind, he must himself have reefed a topsail in a wind. To know how to tell a man to ease a weather sheet or to work the gear of any part of a ship, he must have had his practical experience on that same gear. He cannot instruct his men properly, he cannot command them safely and efficiently, unless he has been through three or four years of hard practical experience, hand in hand with the men in the forecastle. The same thing is true of engineering. No man is fitted to be superintendent (or manager) of a road or works, no man is capable of carrying on large engineering operations until he has had the practical experience which fits him to pass judgment upon what will be the result of the directions which he may give to others."

Four years is but a small part of Faraday's period required "to make a man" in the physical sciences, and in so short a period (which is the duration of the engineering college course) only the foundation of the engineer (the man in science, business, and sociology) can be laid. "There is a great difference between reading and study; or between the indolent reception of knowledge without labor, and that effort of mind which is always necessary in order to secure an important truth and make it fully our own," said Joseph Henry; and the engineering college course should be bent toward such a complete and true presentation of thorough science and truth that the student is incited to permanently secure it for himself and make it fully his own,—and he may then put it to valuable use in future practice. "It is not enough to join learning and knowledge to the mind, it should be incorporated into it."

The engineering college graduate should be a fertile and an exact thinker, and a man of value upon his graduation; but he cannot come to his highest fruition until years thereafter. The speaker would gladly be judged of the success of his teaching by the success attained by his students after years of practice in their profession, but let no judgment be passed, as is so often done in our colleges, upon the basis of wages received during the year after graduation. Our engineering college teaching may be properly condemned if it does not plant those methods of thought which will grow more valuable with the years, and indeed become most valuable only after the mature development of the individual.

The engineering course should not be too formal or limited to the expository methods used of old in instruction in classics. Professor Tait speaks the views of the scientist when he says: "It is better to have a rough climb (even cutting one's steps here and there) than to ascend the dreary monotony of a marble stair-case or a well-made ladder. Royal roads to knowledge reach only the particular locality aimed at, and there are no views by the way. It is not on them that pioneers are trained for the exploration of unknown regions." The truth of this proposition has been discovered of late years by even the most ardent classicists, and those of us who are called upon to teach men in every one of whom must be developed a certain spirit and power "for the exploration of unknown regions"—we who meet this unique problem, untrammeled by traditions and strongly aided by the influence and examples of the old engineers, should most fully appreciate and adopt this precept of a great mathematician and philosopher.

To the engineering student in college, the laboratory is of inestimable value. In it he can learn the true relations between science pure and science applied. He can learn to reason true, from cause to effect. His mind may be developed less trammelled than in the class room, and the inspiration to independent thought may be more readily given deep root. "Every branch of engineering is becoming more firmly rooted to the scientific bed-rock upon which it rests," and the engineer must be a man of scientific methods, besides being a man of business. He must have learned with the scientist

that the price of success is constant, concentrated effort. All this can be taught better in the laboratory than in the class room. A spirit of indifference which may be readily bred in the class room, and which is ruinous to success and happiness in life, cannot exist in the laboratory that is properly administered. "Genius is nine parts character. The prize is to him who dares, not merely to him who can." In the laboratory the student may be inspired to dare.

It must not be thought that I do not give adequate place to the class-room lecture and the text-book recitation. The laboratory work should be carried on in unison with and fortify the work of the class-room. A power may be had through it which cannot be gained in the more formal meetings, and I would have at least one-half of the time allotted by students to the study of applied science, spent in properly supervised laboratories.

The subjects taught are not of so much importance as the effect to be gained in the student's powers, but certain branches lend themselves particularly to the desired end and admirable laboratory equipments in those branches are essential to every fully succcessful school of engineering. There the budget of the university is affected. It requires large sums of money to equip, maintain, and administer such teaching laboratories, and only few of the greater engineering schools have yet approached a satisfactory point therein. In this State of great mineral wealth, that has been, and is still more largely being, developed through the knowledge of the engineer, it is reasonable to hope that some public-spirited citizen of ample means will adequately endow the engineering laboratories of this, the University of his own State, so that they may take and hold due rank with the best.

But some of you may say, what is the benefit to the body politic of the expensive laboratories in our midst? We admit the benefit to the students who personally enjoy their advantages, but is their effect more far-reaching? Most assuredly their effect is more far-reaching,—it reaches to the uttermost limits of the industrial progress and prosperity of the land. In this nation, the industrial pursuits are engineering pursuits, and each betterment of clear perception amongst the engineers goes to strengthen the roots of our whole national life. He who truly ponders the question of modern civilization, cannot but admit that its best and kindest features rest immediately upon the foundations of scientific discovery and invention, and that the engineers and their works constitute the most mighty human force now moving society.

Let us think of a few of the engineering feats of the century gone by:

George Stephenson, in 1829, after painfully developing the locomotive, won the Rainhill contest and the pre-eminence of steam locomotion over draft animals was established before the world. Here was the christening of that civilization which rests on the ready communication between the people.

Joseph Henry, engineer by nature and education, scientist of renown, perfected the electro magnet, adapted it for signalling purposes, and taught the world how to operate it at a distance. The fruits of this single application of electro-magnetism, brought to commercial perfection through the efforts of the then derided Morse and the brilliant Graham Bell, have twice revolutionized the commerce of the world and incalculably advanced its civilization.

Through the brilliant and daring Ericsson, one of those mighty acts of Providence that sometimes occur in the guise of miracles, was wrought in Hampton Roads for the preservation of independence and liberty amongst the race.

These examples from the last century are sufficient to serve my purpose of illustration. The progress of the new century bids fair to magnificently exceed the past.

The engineers of the world may be thought of in connection with three classes:

1. The scientific followers after principles and inventions.
2. The plodding constructors and originators of structures.
3. The engineering plungers and promoters.

The first are to-day by far the greatest, and their pre-eminence grows with each application of new discoveries to the use and convenience of man. But we must not fail to give proper honor to the faithful workers of the second class who founded the profession and are yet its mainstay; or to lend due admiration to the brilliancy and daring of the third class.

In the first class are found such names as Rankine, Lord Kelvin, Werner Siemens, John Hopkinson and Joseph Henry, to whom I have referred. In the second class stand Telford, Stephenson, Gramme, Corliss, and many others of renown; while James Watt stands as a link between them and the first. The third class lists such men as the admiration compelling Ericsson, Bessemer, Holly and Morse.

These men, who have so largely contributed their part of blood to the living strength of the industries, whom I have selected to represent the past in engineering, are giants in beneficent influence upon the growth of civilization and the development of the wealth of the world. Their lives will be felt until the name of the nineteenth century is blotted from the memory of man. Each has played his part. The industry promoting Bessemers more immediately increase the wealth of the world; the steady Telfords and Stephensons contribute much to its permanent comfort and convenience; but the scientific discoverers of principles and engineering inventions appear to lend the most far-reaching influence on the world and its civilization. Let us see what foundation of knowledge now exists upon which such men may base their work.

With all the effort of the centuries since the days of Gilbert and of Bacon, when the validity of experimentally proving natural laws was firmly established, we have really advanced but little towards the heart of Nature's

secrets. The material progress of the world depends largely upon improvements in our methods of utilizing what we now think of as three factors.

1. The properties of material matter.
2. The characteristics of energy.
3. The characteristics of intellect as found in organic life.

We are yet profoundly ignorant of the ultimate character of either matter, energy, or life. Experiments seem to indicate that we may find the clue to the mystery of the first two, but it is yet impossible to assert whether in our present state we may reach an entire understanding of their true character. Experimental investigations often become increasingly difficult as we approach the goal of ultimate truth, and the final attempt to press into the citadel of a cardinal truth may cost more effort than all of the approach through the outer works.

However, we have gained a store of knowledge about materials, energy, and organic life, and have organized it in such a way that it seems to point to a few great, generalized facts. We apparently have learned that Nature is never idle, but that she is a persistent worker with a steady, cumulative activity in which there is ever a unity and no discontinuity; that there is an ever present dovetailedness, as Dickens, I think, put it. Nature's activities are not isolated and independent of each other, but are apparently all in intimate relation, and governed by the same all-pervading fundamental laws. This is the foundation on which the engineers of the present century have to work. Meagre as it is, it is far in advance of that occupied by their predecessors of one century ago.

Of fundamental laws we seem to have proved two,—the law of the conservation of energy, as it is called, and the law of organic evolution, which controls the development of life through the "survival of the fittest." I spoke of these as proved, and so they have been as far as they relate to the problems of our daily life; but they have been rather deduced by inference, as far as the universe at large is concerned, than established by demonstrations. The law of evolution has been so widely discussed in type and speech, that I may assume on the part of each of you some knowledge of its doctrine, and I will at once pass on.

The Law of Conservation of Energy asserts that energy cannot be created nor destroyed. We may transform energy in any manner within the compass of our intellect, but we finish with the same amount of energy as we started with. We may transform the chemical energy of coal, by combustion in a boiler furnace, into heat energy, and this may be utilized to "raise steam." The energy in the steam may be transformed into mechanical energy by means of a steam engine, and this into electrical energy by a dynamo. The electrical energy will be less than the original chemical energy because some of the heat has gone to contribute warmth to the surrounding air and solid bodies, but the available electrical energy added to all of this heat (which has not been destroyed, mind you, but continues to

exist as heat) makes a sum which exactly equals the original chemical energy in the coal.

Another fundamental law has been ordinarily accepted as governing. This relates to matter. You all know that matter is apparently indestructible. Transform it as we may; change, by combination, the matter which we call hydrogen and that which we call oxygen into that which we call water; again, combine this with metallic sodium to form caustic soda; again, form other combinations or compounds;—but through them all we have apparently transformed matter without gain or loss, and hold the same mass at the end of our transformation as we held at the beginning. The chemists have been making a very thorough study of this idea, for years past, and they do not seem convinced that it represents a universally applicable law; but for all present purposes of the engineer it may be safely accepted.

In accordance with these laws relating to matter, energy, and life, and their myriad of corollaries, the professional engineer must carry on his work through the discovery of scientific principles and their useful combinations. Invention is no longer a mere question of designing a working machine. That may now be safely left to the skilled mechanic; while the engineering inventor must discover new combinations of scientific principles and give them applications that are useful to man in order that they may more perfectly contribute to the support of the race. Men must be educated for this purpose in our Schools of Applied Science. This education cannot be efficiently gained without the help of the schools.

Again, new principles must be discovered and great laws deduced, and contributions must be levied from them for the support and advancement of the race. It has long and justly been regarded a signal achievement to discover an important phenomenon or principle in science, and the discoverer has been stamped a learned and great man. It is still a signal achievement to discover, but the discoverer may add lustre to his fame in our time by directing the application of his discovery to the service of mankind, so that no undue delay may be suffered to occur before it too contributes to the welfare of civilization. These men also may be most effectively educated in our Schools of Applied Science.

The motive force of progress and civilization at the opening of the twentieth century is infinitely greater than at the opening of the nineteenth, largely due to discoveries and the world's slight education in science; and the possibilities following great discoveries are equally increased. Carrying this education, of the people in applied science, to its farthest, must accentuate the progress, bringing with it those trains of good that follow in the wake of broader intelligence and wider opportunities. Every industry, every line of transportation or system of intercommunication, every branch of useful endeavor, has profited by the growth of scientific teaching and the work of the engineering schools; and civilization, which spreads, fattens, and grows great through transportation and intercommunication between peoples, has been the gainer. Manifestly, the influence of the Schools of Ap-

plied Science is vastly greater than the effect directly produced on their individual pupils,—large though the latter is.

Consider the growth of our own people! The nineteenth century opened while the meridian crossing the center of our population bathed half its length in the Atlantic ocean. Now it approaches its baptism in the Mississippi. The opening of our fertile domains, of which this tells the tale, is a story of transportation and intercommunication—the steam railroad and the electro-magnetic telegraph, applied science allied with vigilant energy.

Much was formerly preached of a discord between theory and practice in engineering. But no such discord ever existed except in the minds of the unlearned, and with even them it existed only as the suspicion arising, as Bacon says, "of little knowledge." Even this phantom was banished in 1855 through an admirable address by the learned engineer, Professor Rankine, whose discoveries added much to engineering practice and whose early death was so deeply mourned. After tracing the development of meagre scientific knowledge and mechanical practice amongst the ancients, Professor Rankine makes the following observations:

"As a systematically avowed doctrine, there can be no doubt that the fallacy of a discrepancy between rational and practical mechanics came long ago to an end; and that every well informed and sane man, expressing a deliberate opinion upon the mutual relations of those two branches of science would at once admit that they agree in their principles, and assist each other's progress, and that such distinction as exists between them arises from the difference of the purposes to which the same body of principles is applied. If this doctrine had as strong influence," continues Rankine, "over the actions of men as it now has over their reasonings, it would have been unnecessary for me to describe so fully as I have done, the great scientific fallacy of the ancients. I might, in fact, have passed it over in silence, as dead and forgotten; but, unfortunately, that discrepancy between theory and practice, which in sound physical and mechanical science is a delusion, has a real existence in the mind of men; and that fallacy, though rejected by their judgments, continues to exert an influence over their acts. Therefore it is that I have endeavored to trace the prejudice and practice, especially in mechanics, to its origin; and to show that it is the ghost of a defunct fallacy of the ancient Greeks and of the mediaeval schoolmen."

Enough has been said to illustrate my point. The influence of Schools of Applied Science is vast and far-reaching; and every dollar spent in the establishment and maintenance of well considered schools not only returns abundantly to the States in which the schools are centered, but their usefulness may extend to the nation and the world at large. Patriotism now needs no better object than the founding of such schools.

We may now justly turn to inquire into the character of the education for the individual that may be derived from such schools. Herbert Spencer names in a sentence the true criterion by which to judge of the adequacy of an educational process, and I cannot refrain from a quotation:

"To prepare us for complete living," says he, "is the function which education has to discharge; and the only rational mode of judging of any educational course is, to judge in what degree it discharges such functions."

Here arises the query, what is complete living? Spencer answers this, but we may each likewise answer for himself out of his personal consciousness, and experience: an education for complete living includes training the faculties of self-preservation, the faculties of self-support, the faculties of proper parentage, the faculties of proper citizenship including the betterment of our political and social relations, the faculties of properly enjoying one's leisure and lending enjoyment to others. Education, to use the words of Huxley, "ought to be directed to the making of men" and must include "things and their forces, but (also) men and their ways." We cannot, we must not, cultivate one to the exclusion of the other.

The study of science and its applications, in the atmosphere of our better engineering schools, certainly lends largely to each of the faculties and powers which are required for complete living. It has been asserted that it lends more immediately to the earlier and less disinterested ones; but this assertion I must deny. The profession of the engineer demands a creative imagination cultivated to the sober, clear sight which sees things as they are; and a quick appreciation of the effect of sentences and their combinations; which make him akin to the creators of art and literature, and give him in large degree the more disinterested faculties named. I am willing to yield to no one in an appreciation of art, literature, and music as an element of the highest importance in the education which goes to relieve the strain of an over strenuous professional existence and to smooth the relations between fellow men; and I cannot but regret that these liberal branches must be omitted from the curricula of the engineering schools. But I also cannot fail to remember that an education in applied science brings keenness of perception, and recognition of truth and beauty, to its average followers, from which springs an appreciation of art and literature and music which rivals that produced in the most gifted product of the literary colleges. "With wisdom and uprightness a nation can make its way worthily, and beauty will follow in the footsteps of the two, even if she be not specially invited."

Of all the intellectual faculties which we cultivate through education, the most useful is the faculty of sound and mature judgment, and of all, this is the one most often deficient. Here the laboratories of applied science are strong in their influence for good. That man who follows the laboratory courses in one of our well administered engineering colleges and goes forth without improvement in his faculty of judgment and a quickening of his executive powers is an unworthy son of man. The force of straight thinking cannot be overestimated. "Victory is for the people who see things as they are without illusion, who do not take phrases for facts," and straight thinking is one of the gifts derived from the engineering laboratories. The engineer's duties require that he shall possess this most important of mental at-

tributes; and fortunate it is for the profession, for it makes of every great engineer a man of greatness. Do you question this statement?—if you but inquire of the past you will find it proved. Amongst no class of men is found a broader sympathy with humanity and a more liberal view of the progress of the race than is exampled in the lives and works of the great engineers, and none have been better or nobler citizens.

Yet, withal, it must be a matter of concern in the technological schools lest the lines be drawn too close, and the student become absorbed in an ungenerous, over-earnest pursuit of details. Breadth of view may be sacrificed unless our teachers be men of ripeness and power, and the students learn through them that each element in the life of the "complete liver" has of itself an intrinsic merit. This fear of a belittled outlook for some of our students, whose ambitions or mental aspirations may have never been stirred in their precollege days, would be dissipated could the personality of each teacher in the schools of applied science include that rare combination of mellow scholarship, clear scientific perception, and engineering common sense which we occasionally meet and which a few colleges rejoice to retain in their midst.

The teaching force of an engineering school should ideally be made up of engineers,—men who have seen some years of successful practice (and preferably continue to hold some practice), who are held in esteem for such by their brethren in practice; but who have a joy in the quiet life of the scholar which is traditionally associated with the colleges, and who may thus be contented when outside of the immediate tide of engineering production. Yet the teaching of engineering is a question of pedagogy rather than of the engineering profession, and it must be dealt with with this clearly in view. Here is one source of many profound imperfections in our existing schools. I venture to say that it is the exception rather than the rule when a teacher in a school of applied science has given any consideration to the tenets of psychology and pedagogy, upon the due application of which depends much of his success in properly impressing his students. These teachers are doubtless no greater offenders than their brethren in the so-called colleges of liberal arts, but in this is found no palliation for the offense. Fortunately, a goodly proportion of the older ones amongst the devoted men who are contributing their blood and brains to the welfare of the engineering schools are often endowed with a natural sense of fitness in the processes of education, and the younger gain due appreciation of methods from association with them. Yet I must regret to say that proposals relating to the curricula of the technological schools are frequently offered which unpardonably violate every tenet of good teaching.

This condition ought not to exist, and it cannot continue after the truth has seized hold: that these schools are facing a teacher's problem which must indeed be met by engineers with all of the directness and power of the engineer's best efforts,—but that the problem cannot be solved as one solely relating to the engineering profession.

It is sometimes thought that men who cannot make a success in business life are just right for teaching. This is entirely wrong, and the idea should not be admitted for a moment in any modern technological school. The discontented man who has made a failure in business life will certainly make a failure in teaching engineering. Engineering colleges should avoid "men who are fools in working," even though they are "philosophers in speaking." Enthusiastic men are wanted; they may be young men, if needs be, but they must be paid well enough so that they may take places as self-respecting members of the engineering profession, and they must be properly chosen with respect to their qualifications. These men must be good professional engineers; they must possess power and satisfaction gained from engineering research, and from attainments in other lines than those of purely professional acquirement; but sound teaching is their work of first importance. It is very difficult to teach well, but that is no excuse for admitting poor teaching into the engineering schools.

The problem in the engineering colleges is rendered more complex by the character of the curricula, which require that the students shall follow for a period what may be denominated preparatory science instruction before they enter upon the truly professional work. In the latter, at least, the teaching should be largely by inspiration and suggestion.

The process of gathering, organizing and assimilating knowledge by each student should, as Spencer suggests, be as far as possible a process of self-evolution. If a professional student will not follow his work with zest and satisfaction, it is a thankless and doubtful task to force him to it. The best method for the teacher in professional subjects (but the method of all methods difficult to follow without abuse), is indicated in Kipling's verse:

"For they taught us common sense,—
Tried to teach us common sense—
Truth, and God's Own Common Sense
Which is more than knowledge.
* * * * * *
"This we learned from famous men
Knowing not we learned."

The engineering colleges are at fault in not more fully developing the initiative, the enterprise, and the executive powers of their students, though this is a difficult part of the task of "making a man." But that thing must be done in order to make successful industrial engineers. It can be done largely by influence, by the character of the treatment of the students, and by the sort of ambitions that are put into them. It can be done in some degree by the selection of the work assigned to the curriculum, but the subjects studied are of less importance than that the students learn,

"Truth, and God's Own Common Sense."

The teacher must remember when he tries to teach by inspiration, even though his time and method be wisely chosen, that he may expect to receive

in the class-room some hard blows to his self-regard and his esteem for his teaching. He may pour stimulating thoughts over his students day after day for weeks and finally find that few have taken root. He may even be brought to that state of desperate depression that is illustrated in one of Turgenev's novels when its hero, Dmetri Rudin, failed to succeed in his post at the University. The engineering teacher—provided he is sure of his time and method—may take heart by remembering this: that if every stimulating thought presented to his students, whether relating to professional applications of theoretical principles or directly to the development of initiative, self-reliance, and executive powers—if every stimulating thought took root in every student's mind, those minds would become overburdened cyclone centers of thought, and if one real thought takes root from time to time in each student's mind the teacher may be truly satisfied.

I have already suggested that the question of professional instruction in the engineering schools is entangled with the problem of leading the students through a course of preparatory science looking towards the professional studies. The medical schools may and largely do escape this responsibility by requiring their students to pursue a liberal college course before embracing the professional courses. The existing plan of the medical schools is ill-advised when viewed from the engineer's standpoint, but we hope that some inviting plan may yet result from the proposals made by several great university presidents in respect to co-ordinating the liberal and professional courses. We would gladly welcome the old-time college course and the old-time preparatory course, especially, so far as they made men of vigorous thought who could spell and cipher, and we now gladly receive and encourage all students who have been willing and able to complete an academic college course before entering upon their technological studies.

Broadly, however, until there arises such an advantageous plan of coordination which may be adopted with benefit to our students and to the engineering profession, the engineering schools will continue to instruct their students for four years immediately following the high-school course,—the first two years being largely filled with mathematics, chemistry, modern languages, drawing and other subjects leading to the professional studies of the engineer. These students come freely to the college at an age between seventeen and twenty, equally immature in mind and body,—and one part must not be trained at the sacrifice of the other. "It is not sufficient to make his mind strong, his muscles must also be strengthened; the mind is overbourne if it be not seconded."

Montaigne puts it very gracefully: "It is not a mind, it is not a body which we erect, but it is a man, and we must not make two parts of him." A prime requisite to success in life "is to be a good animal," and the engineering school must look after the bodily and social welfare of these entering students in a way that is not required of the medical school with its course largely recruited from the liberal college. These students should be encouraged to enter into the various interests of the life around them, especially of

the college life, including its social affairs and its athletics and gymnastics. The extra responsibility which thus rests upon the teachers in the engineering school, equally increases the effect of the influence with which his personality affects his students. The latter is a recompense that every lover of teaching will willingly make sacrifices to obtain.

My discussion of my subject has been brief; though perhaps as long as you desire. I have tried to show you that the wide influence of the engineering schools is of two branches: First, a direct effect exerted through the graduates extending the useful applications of science to the advantage of man (which is the effort of every true engineer); second, an indirect (but equally important) effect resulting from the admirable education disseminated amongst the people. And I have pointed out not only elements of great educational strength, but also some sources of weakness in the schools. It has been my particular wish to bring to your mind some image of the potent influence for good which has been in the past, and still more may be in the future, borne in the body politic by these schools, and to impress you with the desirability of bringing to their support, the same bountiful endowments that are now justly flowing to the support of the medical schools. I trust that I may have interested you, and that I may have reached, in some degree at least, my object.

In the course of my remarks I have had frequent occasion to use the phrase "applied science." You must not mistake me. Applied science is not something set off by itself and differing from "pure science," so-called. Far from it. It is pure science, if you wish, pursued in the stimulating, nutrient atmosphere bred of the belief that all scientific knowledge returns to its possessor great good in proportion to the advantages which he, through it, brings to mankind. Such an atmosphere is to be found in many of our medical schools, and, I hope, in all of our engineering schools.

FRIDAY EVENING.

THE STUDENTS' PARADE.

About 500 people took part in the illuminated parade of students and alumni. The procession was marshaled by Mr. Harry P. Gamble, an alumnus of the University. The line was formed under the arc lights of the campus and moved at 7 o'clock, going north on Twelfth Street to Pearl, thence west to Tenth, north to Spruce, east to Twelfth, north to Pine, east to Fifteenth, south to Pearl, west to Twelfth and south to the University. Music was furnished by the Elks' band, which marched at the head of the line, followed by the cadet corps of the State Preparatory School.

The alumnæ of the institution rode in a tallyho, behind which marched the alumni. Classes were distinguished by transparencies, colors, yells and songs.

Following the alumni were the college seniors, who represented in a spectacular way the progress in dress, modes of travel and college life since the founding of the University. The first graduating class ('82) was represented under its own colors (blue and gray) riding in an old stage drawn by six horses and carrying sixteen students dressed in the costume of the early days. A prairie schooner followed, decked in the colors of the University (silver and gold). Its occupants represented the early life of the State. Then came an automobile, decorated in the colors of the class of '03 (brown and gold), carrying two seniors in cap and gown.

The juniors followed with a float which carried the young women of the class. Class numerals were displayed on an arch, and the decorations were in evergreen and the class colors. The young men of the class marched behind in column.

The sophomore division was headed by a large transparency in the form of a tetrahedron, bearing on two sides the numerals of the class, '05, and on the front "Clear the track." The feature of this division was the tallyho which carried the young women of the class. The inscriptions were: "Cicero, Cæsar, Livy and Ovid."

The freshmen appeared as infants, dressed in white. The young women rode in tallyhos, while the young men, wearing dunce caps, marched behind.

Following the college came the professional schools in the order of their establishment. The School of Medicine gave a spectacular repre-

sentation of the progress of the medical profession: An Indian medicine man; a quack doctor; an old-time doctor on horseback; a country doctor in his buggy; a city doctor in his rubber tired carriage and an up-to-date doctor in an automobile. The nurses of the hospital corps followed in a carriage. A wagon carrying patent medicine men, stopped at frequent intervals, its occupants crying out their wares and distributing advertisements. The alumni of the medical school rode in carriages and carried torches. Most of the present student corps marched, the freshmen wearing white gowns and skull masks. An open carriage contained two skeletons which, by means of mechanical contrivances, were made to salute the spectators.

The members of the Law School rode in tallyhos suitably decorated and illuminated with torches. The students were all provided with Roman candles, which were used very effectively.

The Engineering School brought up the rear with a forty-foot banner bearing the inscription, "Last but not least." Most of this school marched in machinists' costume, overalls, jumpers and black skull caps. A float carried a model of the engineering building twelve feet long, lighted from within and with smoke issuing from the stack. Another float carried a forge, lathe and anvil, at each of which men were at work making souvenirs of the occasion. A third float carried a white dome fourteen feet high brilliantly lighted by electric lamps. The current was furnished from a dynamo run by a gasoline engine. The president of the class and the one lady student of Engineering rode in an open carriage.

THE RECEPTIONS AND REUNIONS.

These were held in the Main Building Friday evening after the parade. There was a large attendance of University and town people. The following committees received the guests:

RECEPTION COMMITTEES.

FACULTY.

President and Mrs. Baker.
President Jacob Gould Schurman of Cornell University.
Dean and Mrs. Hellems.
Professor and Mrs. Brackett.
Dean Stratton.

Dean and Mrs. Rowe.
Professor and Mrs. Reed.

OLD TIMERS.

Mr. and Mrs. George Andrews.
Mrs. A. W. Bush.
Mr. and Mrs. Henry Drumm.
Mr. Luther Hixon.
Mr. and Mrs. John Johnson.
Mr. and Mrs. F. W. Kohler.
Mr. A. J. Macky.
Mr. and Mrs. James P. Maxwell.
Mrs. J. H. O'Brien.
Mr. and Mrs. A. F. Safeley.
Mr. and Mrs. D. K. Sternberg.
Mrs. C. M. Tyler.
Mr. and Mrs. Eugene Wilder.
Mr. Hugh R. Steele, delegate from Colorado Pioneers' Association.

ALUMNI AND FORMER STUDENTS.

Mr. Henry O. Andrew.
Mr. and Mrs. Edwin L. Coates.
Miss Edith DeLong.
Miss Maud Elden.
Mr. and Mrs. Harry P. Gamble.
Mrs. Maud Clark Gardiner.
Mr. A. A. Greenman.
Dr. and Mrs. Philip H. Keyser.
Mr. Omar E. Garwood.
Mr. and Mrs. Edward C. Mason.
Mr. and Mrs. T. A. McHarg.
Miss Jennie Sewall.
Miss Emma L. Sternberg.
Mr. and Mrs. Montford Whiteley.
Mr. and Mrs. Richard H. Whiteley.
Mr. and Mrs. Franklin P. Wood.

SATURDAY MORNING.

THE GENERAL EXERCISES.

PROGRAMME.

Organ Prelude. Pilgrims' Chorus. *Wagner.*
WILLIAM DUANE, Ph. D.

Invocation.
The Right Reverend CHAS. S. OLMSTED, D. D., Bishop of Colorado.

Quartette. From Faust. *Gounod.*
MISS ROSETTA G. BELL, MR. CHARLES INGRAM.
MISS MAY WHITMORE, MR. WILLIAM BELL.

Scripture Reading.
FRED B. R. HELLEMS, Ph. D.,
Dean of the College of Liberal Arts.

Hymn No. 714. "How Firm a Foundation."
THE CONGREGATION.

Address. The University Past and Future.
PRESIDENT JAMES H. BAKER, LL. D., University of Colorado.

Vocal Solo. Aria from Samson et Delila. *Saint Saens.*
MISS ROSETTA G. BELL.

Oration.
PRESIDENT JACOB GOULD SCHURMAN, D. Sc., LL. D.,
Cornell University.

Hymn No. 1161. "My Country, 'Tis of Thee."
THE CONGREGATION.

Response by the First President.
JOSEPH A. SEWALL, LL. D.

Address by His Excellency the Governor of Colorado.
HON. JAMES B. ORMAN.

Responses by Delegates of other Universities.

Benediction.

Organ Postlude. Military March. *Schubert.*
WILLIAM DUANE, Ph. D.

The exercises of the morning were the most elaborate of the entire celebration. There was a large attendance of alumni, former students,

old-timers, donors and benefactors of the University, together with distinguished citizens from various parts of the State, and delegates from Universities, to which invitations had been sent.

Bishop Charles S. Olmsted, who was to have given the invocation, was unable to be present and in his place Rev. E. G. Lane of Boulder gave the opening prayer. The President of the University, Dr. James H. Baker, headed the procession which entered the church, where the exercises were held, shortly after ten o'clock. This procession included the orator of the day, President Jacob Gould Schurman of Cornell University, Governor Orman, ex-Governor Adams, Messrs. Kendrick and Thompson, Regents of the University, President Charles S. Palmer of the State School of Mines, Dr. Joseph A. Sewall, the first President of the University, the deans of the different departments and members of faculties. President Baker made the first address.

ADDRESS BY PRESIDENT JAMES H. BAKER.

THE PAST AND FUTURE OF THE UNIVERSITY.

We celebrate the twenty-fifth anniversary of the opening of the University of Colorado. The University was incorporated by an act of the Territorial Legislature in 1861. At the date of its opening, 1877, the organic law had made it an institution of the new State. It had an endowment of public lands granted by Congress and a fixed income provided by the first General Assembly. It owned the present site previously donated by citizens of Boulder and upon it stood, solitary, the main building. The founding of the University had not been accomplished without struggle. For more than fifteen years—nearly the entire period of our territorial history—a few men had stood for the project. Pioneers are always made of better than average stuff. The guiding spirits of Colorado's early period were choice men. Their interests were not merely material or selfish; they had a vision of the future and recognized their obligations in the formative period of the State's ideals. The people of Boulder, with a sacrifice in many instances heroic, contributed to the necessary funds for the first building of the University. This preparatory stage of history is to be gratefully remembered and we cordially greet the pioneers who are here to-day to view the progress of the structure whose foundations they helped to lay.

The first period of growth was under Dr. Sewall's presidency. At the start the institution was neither university nor college; it had only Normal and Preparatory classes. There were two instructors and forty-four students. During this period the College of Liberal Arts was well established,

the School of Medicine was opened, and five buildings in addition to the main building were erected. The University then had difficult problems: it must remove prejudice, make friends, secure funds, prove the value of its service, and help solve the doubt then existing regarding the place of state universities. Two of the strong professors who in those days helped the President and Regents solve some of these problems are still in the service of the University.

President Hale's administration reached from July, 1887, to January, 1892. In this time Woodbury Hall was erected and the Hale Scientific building was well begun. Several able men were added to the College Faculty, and the influence of the University in the State was much extended. The Normal Department was dropped in 1891.

To-day I wish to pay a tribute of gratitude, not only on grounds of personal friendship, but in behalf of all friends of the University, to President Sewall and President Hale and those who aided them in their noble work. One is with us, still in the full vigor of his great intellectual power, a most honored and welcome guest; the memory of the other is enshrined in the hearts of those who knew his public service and his generous character.

The work of the last ten or eleven years, while still pioneer work, has been easier because of the previous history. The plant had been storing up energy for a larger growth; the results of previous effort began to appear. The Engineering, Chemistry, Gymnasium and Hospital buildings have been erected, and the foundation has been laid for a Library building. A School of Law and a School of Applied Science have been established, and graduate courses have been organized. By an arrangement with the city of Boulder the Preparatory School has been given separate grounds, building and organization. The income of the University has been more than doubled; the College Faculty has been largely increased. Whatever has been accomplished is due to strong co-operation within the University and outside. I personally know of the efforts of hundreds of friends of higher education within the State, who have helped to strengthen the edifice and to whom the grateful acknowledgments of the University and the friends of education everywhere are due. In the period of stress, 1898-1900, when the revenues of the State were inadequate to pay appropriations, loyal men in this and other cities advanced funds to save the institution. I would here mention the gratuitous services of many lecturers in the Law School, prominent men in their profession, who have contributed greatly to the success of the school.

As the result of twenty-five years of work, every portion of which has contributed to the outcome, we have a University with Graduate Courses, College of Liberal Arts, School of Applied Science, School of Medicine, School of Law. Counting the Library building now in process of construction, there are thirteen buildings. The library is excellent and the laboratories and shops are fairly well equipped. The professors, lecturers, and assistants number 105. The students number about 550 in the University and

375 in the Preparatory School—925. Five hundred and twenty-six degrees have been conferred by the University, and 379 pupils have been graduated from the Preparatory School. The standard of admission to all departments is at least a four years' high-school course. The Medical course covers four years and the Law course three. The College curriculum is modern. The Regents are zealous for the welfare of the institution; the members of the various faculties are men well equipped for their specialties and are devoted to the University. Between the faculties and the students a spirit of mutual helpfulness exists. Student self-government though not a system is freely used. The relation with the high schools of the State and with the people is most friendly and encouraging.

The University of Colorado has a normal history, namely of struggle and gradual growth, a history that makes character for institutions as well as for men. It is a history of public-spirited citizens, of able and devoted teachers, many of whom have fallen by the way or gained promotion to larger positions, of financial limitations gradually overcome, of students with their ambitions, mistakes, struggles and successes, of a yearly increasing alumni who are beginning to realize their privileges and duties as members of the graduate body, of gradually developing ideals and standards. The most interesting part of our life the past few years has been the gradual dawn of self-consciousness within the University—a real event in the life of institutions as well as of individuals. The student body has a new power of initiative and helpful activity. The problems for the future are taking shape within the faculties. The achievements of our graduates in teaching, in professional life, and in scientific research are dear to us and in many instances are known and respected throughout the country.

I shall not attempt to picture our future growth. Added buildings, equipment and teaching force will come in time, and the rate of development will depend chiefly on the rate of increase in income. In respect to standards, usefulness, influence and reputation an honorable place among the great universities is assured. Neither shall I take up the stock problems of the organization of American universities, although they are many and demand an early solution by the older and larger institutions. The relation of a university to the spirit of the times and the needs of State and society is a more important theme.

We are a practical people and demand returns for our investments, and this is right; but it may not be possible to measure the best elements of national life by commercial standards. America in its pioneer stage has been obliged to emphasize things; we must learn to emphasize life. Some one has said that noble sentiments, poetic ideals, heroic deeds, artistic productions, and moral achievements are the best material for the instruction of youth. Without ideals a nation can not be great. Their value cannot be given in terms of utility, but they are the soul of all utilities. We estimate the work of universities on too low a plane. The achievements of college men in business are no proper criterion for the value of higher education. True, higher

education reaches everything that helps constitute the material side of civilization, and without its influence all industrial and commercial interests, political standards, and inventive power would degenerate. But it does more, it gathers up and preserves and adds to and transmits and makes of service, not only all that is best in the practical field, but all that is best in the field of man's spiritual development. Its highest office is contributing to discovery of truth, love of art, and growth of national character.

The English university makes culture its ideal. In Germany a more practical but not less pure aim is creative scholarship and preparation for service for the State. Our educational object is somewhat peculiar to our history; it may be defined as individual worth and power and intelligent citizenship. All these ends are of exalted character. In England and Germany the university holds a noble place in public regard. No less high conception of its function should obtain in America. Statistics of numbers, incomes, and degrees annually conferred are not the best measure of the success of learning. A high average of intelligence, necessary as it is in a republic, is not altogether a substitute for leadership; the spirit of higher education should produce great men—an originative, progressive force in the nation. The sentiment, "good enough for practical purposes," too often characteristic of our attitude as a people, when applied to scholarship is unworthy and tends to limit progress. For practical reasons America needs more of the art idea to exalt her conception of the possibilities of this new but promising civilization.

The American university is in a transition stage. We are adding the German university to the inherited English type. This is done by mere superposition, instead of by readjusting the educational system to the new view. The result is that the whole period of education, general and special, is too long. There is still question as to the fittest university ideal for America, but, when we consider the demand of the times to unite learning with utility, the demand for scholarly research, and the growing belief in the idea of scholarship combined with service for the state and society, we cannot doubt that the tendency is toward the best that is represented in the German university system, of course with proper adaptations to the spirit of our civilization. The latest discussions in England have the same trend. That productive scholarship may become characteristic of American universities inducements must be offered to attract the ablest men to the teaching profession, and leisure must be given them for research and to prepare instruction of the highest standard. The important difference between the average American professor and the English or German is that in our colleges the men are overburdened with special and general duties and have neither time nor strength to give to constructive work.

We come now to a practical question. In this period of change of university organization, what shall be the policy of our own institution? The Graduate School is becoming the characteristic feature of a genuine university. I believe every State university at a proper stage of its development

should exercise the highest university function. Money is required for adequate equipment and able instruction. Will the people take the large view and demand the best for Colorado? Shall our sons and daughters have here opportunities for the highest scholarly attainment? The investment would repay; in time the influence of high-grade graduate work would reach the whole educational system and the State's every interest and activity. It is not enough that such advantage is offered in Germany or Massachusetts. We need it in our midst,—an ideal to cherish as our own, an essential part of the life of the State. The spontaneous energies of a people make for progress; but the State as such must come to self-consciousness. True scholarship is not partisan, it is not selfish or mercenary; it is given to the discovery and imparting of truth. Popular devotion to the support of such an interest will do more than all else to bring democracy to a consciousness of its ideals. Men who love the State, to whom rich returns have come from developing Colorado's resources, could render no better public service than by endowing chairs in the Graduate School of the University for research. The discovery of principles is usually the work of pure science. The knowledge and devotion of the scholar are required to search out fundamental truth, although the practical application often falls to the ingenious inventor. Professional and technological schools hold a great place in the scheme of education, but the faculty of pure science and the liberal arts must remain the center and life of the university.

I would not be understood as advocating mere learning. The gentleman of culture who simply enjoys his culture and his superiority has no place in the world to-day. The scholar should be a patriot in a large sense. The age demands expression. The church is less than ever satisfied with mere subjective religious enjoyment, it engages in practical work for humanity. Ethics as a philosophical study is comparatively useless unless it leads to an ethical life. Knowledge is not valuable unless in some way it is used for others. Education is not education unless it stimulates self-activity. The people may have faith in the spirit of higher education to-day for it aims to help the world. The scholar with open-mindedness pursues his work, not in the monastery, but in communion with nature and life.

It is my pleasant duty to extend the welcome of the University to its guests and friends and express appreciation of the many messages of good will and hope that have come to us from every part of the country.

Dr. Jacob Gould Schurman, President of Cornell University, gave the principal oration, in which he considered some of the problems of the modern University.

In introducing Dr. Schurman, President Baker made the following remarks:

Cornell's President is too well known to require an extended introduction. We are glad to have here on this important occasion in the University's history, a man so well known as a scholar, executive and, I may add, statesman. President Jacob Gould Schurman of Cornell University.

ORATION BY PRESIDENT JACOB GOULD SCHURMAN OF CORNELL UNIVERSITY.

I am very glad upon this auspicious occasion to bring you the greetings of your sister universities and colleges. You have had in the short period of twenty-five years an interesting and truly remarkable development. As the President has explained in his historical sketch, the University opened in 1877, with two teachers and forty-four pupils, and of these forty-four pupils all belonged to the Preparatory and to the Normal Schools. The College proper was not opened until the following year, and the first class graduated in 1882. To-day, I see from your published announcements that you have an entire enrollment of nearly one thousand students, five hundred and fifty of whom are in the University proper, and while there has been this expansion in your numbers, there has been a corresponding growth in your Faculty. From the two teachers of 1877, you have grown to a Faculty of professors, instructors and lecturers, now numbering one hundred and five. So on the material side, the growth of the University has kept pace with its intellectual development. Instead of one main building which you opened in 1877, you now have thirteen buildings, devoted to purposes of instruction and investigation or as houses of residence for your students. Meanwhile, the organization of your University has grown apace. The Normal School has disappeared. The Preparatory School, the President has explained to us, has now separate buildings, and a different organization. The University itself presents to view a graduate department, a College of Liberal Arts, a School of Applied Science, and School of Medicine, and a School of Law. These facts, ladies and gentlemen, which I have ventured to repeat, seem to me to furnish ground for congratulation, and as a representative of the other universities who join you in celebrating this occasion, I desire most heartily for our sake, as well as for yours, to congratulate the citizens of Boulder in the efforts, as the President has explained, in part heroic to secure the establishment of this institution and to provide for its maintenance.

I congratulate the citizens of Boulder and the other citizens of Colorado on the generous manner in which they came to the support of the University in the years of leanness which have followed its foundation. I congratulate the Legislature and the citizens of the State on the provision which they have made for the support of the institution, an institution which is fast becoming the culmination of the educational system of the State, and is destined in the future, to become its crown and glory. But I do not intend,

Mr. President, on this occasion, to dwell upon the history of the University, or even in the presence of his Excellency, the Governor, to plead for larger appropriations for it. Its history ought to be written, for the history of all good causes and noble institutions ought to be put in permanent shape. There are others better qualified than I am to write that history. The State which has supported it in the past must support it more liberally even in the future, but I, with confidence, leave the question of ways and means to the President and Board of Regents. And if I feel the question of ways and means is safe in their hands, I am sure they will pardon me if I venture to make one single observation which I feel confident, in advance, indeed, will have their entire concurrence. I allude to the fact that the maintenance of universities in the twentieth century, aye, and the colleges too, is a far more burdensome undertaking than it has ever been in the past; to say nothing of the humanities, of which I shall speak before I finish, and confining just now, our attention to science alone, I call attention to the circumstance that a generation or two ago, a laboratory was an uncommon phenomenon, and the apparatus with which it was equipped exceedingly elementary and inexpensive. To-day, every department of science must have its laboratory, and so great has been the progress of investigation and research, so important have been the discoveries, so multiplex and delicate the application of them to the material arts that the mere apparatus required by a professor who has a laboratory, in order to illustrate the growth of his science calls for appropriations of a magnitude which would have startled college trustees even a single generation ago. I note, and note with pleasure, that the State of Colorado, by the Organic Act, establishing this institution, is committed to provide the best and most efficient means of imparting instruction, and so on, and I venture to assert that if the State of Colorado lives up to this obligation, and I hope and believe it will, it will need to spend far more money on the State University in the twentieth century and in the first generation of the twentieth century than ever it has spent in the past. I do not, however, propose to pursue further the history of the University or what may be its needs in the future. I intend to take up the time put at my disposal on the subject or subjects, if you like, which have been suggested to me by the charter of the University, and more particularly by that clause of the charter which defines its object, a clause which declares that the object is to provide the best and most efficient means of imparting to young men and women, on equal terms, a liberal education and thorough knowledge of the different branches of literature, the arts and sciences, with their various applications.

This is surely a noble programme. It dedicates this institution to liberal culture and to professional training and it stipulates that young women shall enjoy the opportunities of this higher education on equal terms with young men.

It is true that the definition lays emphasis on the communication of knowledge and is silent on that enlargement of knowledge by means of in-

dependent investigation and research which has been so marked a feature of later American university ideals. But I cannot regard the definition as excluding such advanced and independent work, nor has it been so interpreted by your governing authorities. For you now have a graduate school, and the very meaning of a graduate school is the conception of independent research with a view to the enlargement of human knowledge. If it is the business of the undergraduate largely to absorb existing knowledge (though of course no undergraduate can obtain an education worthy of the name whose mind does not creatively react upon what he assimilates), it is preeminently the business of the graduate student who has already made some advance in the mastery of existing knowledge in his own sphere to extend the boundaries of that knowledge and to contribute something new to the intellectual possessions of mankind. I shall assume, therefore, under the warrant of your actual organization that your charter can be fairly so construed as to authorize provision not only for the imparting of knowledge but also for the enlargement of knowledge by independent investigation. And I will also assume that if at least the means were at your disposal, this University would be glad to have its professors devote a portion of their time to original investigations while the remainder was devoted to the instruction of undergraduates. I make these reflections with a view of showing that the University by its practice, however the charter reads, is quite in harmony with the latest development of university ideals. Twenty-five years ago there were scarcely any graduate students in the United States; to-day the graduate students at our universities number thousands. And the University of Colorado has a right to claim the honor of sharing in this new and most pregnant development of the higher education.

I do not intend to follow this idea further. I mentioned it indeed because I had in mind to dwell rather on the ideas explicitly declared in that clause of the charter which defines the object of the University. These ideas are the equal education of men and women, liberal culture, professional training, and, finally, the provision of the best and most efficient means for the accomplishment of these ends.

On the subject of ways and means I shall speak with brevity. It is a matter that concerns the President and the Regents. But there is one point on which an outsider may be permitted to speak and on which I venture to say I will have their full concurrence. I mean that the instrumentalities and facilities for higher education grow increasingly costly. A generation ago a laboratory was an uncommon building, and even where such a building existed the equipment and apparatus which it contained were of the most simple and inexpensive character. The march of science has been so rapid in the last generation, the discoveries made so numerous and far-reaching, the mechanical devices embodying them so gigantic, so complex, so delicate, that the cost of providing for them in university laboratories has become an enormous burden, though it is absolutely essential that laboratories should possess such facilities to do first-class work. If the State of

Colorado has here erected an institution for the purpose of providing the best and most efficient means of instruction the State of Colorado is committed to the obligation of supplying the necessary means for the attainment of that end,—by the terms of the Act, indeed, "the best and most efficient means." And legislators and people must bear in mind that these means grow every year increasingly expensive. They will also bear in mind that in this case the end justifies the outlay and that education tested by its results amply repays in the contributions it makes to our civilization—aye, to the material aspects of our civilization—all and far more than all that has ever been spent upon it.

But, as I have said, I leave the question of ways and means to the President and Board of Regents and to the legislators and people of the State of Colorado. It is the other ideas contained in the definition of the object of the University which make a special appeal to me as appropriate for reflection upon this occasion. And of these ideas I intend to single out for more detailed consideration the subject of liberal education. Before, however, addressing myself to that problem, I should like to give brief consideration to the two other ideas mentioned, namely, professional training and the equal education of men and women.

I use the term professional education although it is not specified in the charter. The charter speaks "of the knowledge of the different branches of literature, the arts and sciences, with their varied applications." Now the application of the arts and sciences to the pursuits of men is what constitutes a professional course. Since this University was founded the idea of professional training has been developed and expanded. But the idea is clearly enough expressed in your charter, and it might be difficult to find a briefer and apter description of it. It is highly creditable to your legislators and to the men who inspired their legislation that such provision was made here for professional education a quarter of a century ago.

In a way professional education is as old as universities themselves. Indeed, universities took their origin in professional education. The oldest institutions of the kind are the universities of Salerno and Bologna, one a school of medicine and the other a school of law. Salerno has passed out of existence; but, as you know, the University of Bologna not long ago celebrated the eight hundredth anniversary of its existence. The University of Paris, which arose soon afterwards, was pre-eminently a school of theology. And Oxford University, which traces its origin to Paris, was the mother of Cambridge University and, through John Harvard of Emanuel College, Cambridge, the mother of Harvard University and of all American universities and colleges. In English soil the idea of professional training never took such deep root as on the Continent, though in Scotland the continental conception of the university was reproduced. Even in England, however, and also in the United States, professional training was at least connected with colleges and universities. If they did not supply professional training, it was at least assumed that the men who afterwards studied law, medicine,

and theology should be graduates of the university. In the course of time, too, the need of providing professional training at English and American universities became more pronounced and within the last generation professional schools have rapidly multiplied.

At first the tendency was to treat the time-honored professions of medicine, law, and theology as the only liberal professions. The newer American universities to which Colorado belongs have protested against this unwarranted conservatism. They have felt that the great vocations of the modern world should be added to the enumeration of the learned professions of the Middle Ages. The new professions of engineering, architecture, veterinary medicine, agriculture, and others claim equal recognition with law and medicine. We believe that wherever a calling pursued by men rests on a science or a branch of scholarship, such calling is a liberal profession and should be recognized by the universities as such. The change has been in the direction of democracy. Law and medicine are good professions. But they are no better, worthier, or more honorable than engineering or agriculture. The modern universities to which Colorado belongs have thus expanded the conception of professional training and insisted on the equality of professional dignities. A generation ago an engineer was a mechanic; a veterinarian, a horse doctor; an architect, a house builder. To-day the men of these professions rank in the estimation of our universities, and they are fast coming to rank in public estimation also, with the practitioners of law and medicine. Not, indeed, that we are degrading these latter professions. On the contrary the newer universities have recognized their vast importance and made the most ample provision for them. They have only insisted that other professions should be similarly recognized. And I think I am not straining the charter of the University of Colorado when I say that its dedication of this institution not only to a liberal education but to a knowledge of the arts and sciences with their varied applications, gives the fullest recognition to the modern conception of learned and scientific professions and callings.

I want next to say a word on that other conception of your charter, the education of young women on equal terms with young men. Twenty-five years ago it was a great novelty. To-day in one form or another it is a universally accepted principle. It is important, however, to call attention to the fact that the universality of the principle does not necessarily imply uniformity of method. Through all the West the State universities have been open to young women on the same terms as to young men. Everywhere they go into the class-rooms with the young men and enjoy the same instruction at the same time. This mingling of young men and women in the class-rooms and laboratories is generally designated as co-education. Recently, however, we have seen one of the largest and newest of our universities abandoning such co-education. Chicago has voted in favor of the segregation of men and women, at least for the two lower classes, in college halls. This might be called a system of co-ordinate education. As I understand it,

the young women have, or may have, instruction by the same teachers and in the same class-rooms, though not at the same time with the young men. Whether this is a better arrangement than the co-educational system prevailing in Colorado, and the other State universities of the West, only time can determine. But on one point neither Colorado nor any other of the modern universities which have done themselves glory by doing justice to women can ever compromise, namely, on the right of women in the United States to receive the highest education on equal terms with men. Whether they shall enter the class-rooms together or separately; whether they shall be taught by the same or by different professors; whether they shall live on the campus or off the campus, the fundamental idea of equal rights must be preserved. And it is highly honorable to the University of Colorado that this conception was embodied in its charter twenty-five years ago.

As regards the manner in which equal educational rights shall be secured to women, much might be said, though this is neither the time nor the place for anything but the briefest treatment. My own opinion is that we are likely to witness a good deal of diversity of method. In the West and at the State universities the present method, in my opinion, is pretty certain to remain. In the privately endowed universities of the East it cannot be said that this system is gaining in popularity. At best it holds its own. And the oldest universities, which are endeavoring, as some of them are now endeavoring, to make provision for the education of women have as a rule accomplished their object by the foundation of an annex or separate woman's college. The danger of every such arrangement is that the education offered will be inferior to that which men may enjoy. The equal educational rights which Colorado guarantees to women will not as a matter of fact be realized. This evil is partly balanced by the fact that the oldest, largest, and best women's colleges in the country are in the East. And if any young women do not like the education offered in the annexes and separate women's colleges at men's universities, they can leave them and without going far from home enter Vassar, Wellesley, Smith, or Bryn Mawr. What we need, and what perhaps will result from the action of the University of Chicago, is an experiment under which the equal educational rights of women shall be protected, by which they shall secure a higher education equal in content and quality with that received by men, from teachers equally competent and renowned, in class-rooms and laboratories equally well-equipped, and under circumstances and surroundings equally favorable and inspiring. Until such an experiment is made, and until favorable results have been demonstrated, I should advise the women of Colorado to retain the existing method of co-education as the surest means of gaining those equal educational rights secured by the charter.

I must now leave these topics and address myself to that great and fundamental idea of the charter about which in university education everything else revolves. I allude of course to the idea of a liberal education, to the knowledge of the different branches of literature, arts, science, and

philosophy. It is a matter of vital significance that the charter in defining the object of your university makes this idea central and controlling. I feel, therefore, that I shall not make an improper use of the time you have assigned me if I devote the rest of my address to a consideration of the idea of liberal education and of the modifications it has undergone since your University was founded and of the further changes which perhaps impend.

In this presence it is unnecessary to vindicate the idea of liberal culture. It is the education of man as man. It qualifies the student not for winning bread but for high thinking and intelligent living. It has to do not with the body and its needs but with the mind and its aspirations; it appeals to perception, to imagination, to emotion, to intellect, and to conscience. It is as old as civilization. Manual labor was, indeed, in Athens the work of slaves. But free Athenians all knew the value of liberal culture and rejoiced in its possession. Nothing better has been written upon the subject than you find in the writings of Aristotle and Plato more than two thousand years ago. The study of the Greek language may or may not survive in the progress of the human race. But the Greek conception of culture is immortal. They felt that man without liberal culture was undeveloped. They conceived the function of education as a development of the potencies of man. The arts and sciences not only liberalized the mind but humanized the individual. An ignorant, untrained man in their conception was only half a man. From the evolutionary point of view so familiar to our day we might say that liberal education is the process whereby the intellectual possessions of the race are taken up by the individual, who in the process becomes a worthy member of his race. To know and make one's own the best that has been thought and expressed in literature and art, to follow for one's self the method of science in exploring some provinces of the physical universe, to make one's self at home in the world of mind and spirit, and to know some science which records the nature of the environment in which we find ourselves: this is education; this is liberal culture for which your charter provides. It involves devotion to the needs of the mind for their own sake. It is impossible without leisure; the spirit of man will not be unduly hurried. Nor can this good be attained by any one who would subordinate it to some other end. Culture, like virtue, like religion, is its own end. We are so constituted that we long to know, and the mind's aspiration after knowledge is as much entitled to recognition as the heart's aspiration after goodness. A man may be honest because it pays to be honest, but he is not an honest man. A man may pursue liberal studies for the sake of results to be applied to utilitarian objects, but such a man will never be liberally educated. The poets will not breathe their secrets to him. The thoughts of the philosophers are voiceless to him. No object of beauty can be a joy to him and no law of nature can strike him with admiration or declare the glory of God. This conception of liberal culture, is the most prominent conception contained in the definition of the object of this University. In an age in which educational landmarks are fading, in which everything

seems to be in a flux, it should not be difficult for the scholars of Colorado to hold to this great and glorious conception of liberal education. To ignore it; to educate man merely as a bread-winner; to fit him merely for some profession; to teach him how to do something instead of to be something, would in practice be the abandonment of the Hellenic conception of liberal culture which has dominated Christendom and made civilization what it is and the adoption of the stunted and stagnant civilization which makes and keeps China what we know her to-day.

While I (thus) glory in the old conception of a liberal education and believe it is essential to the highest civilization, I am not wedded to all the details of the curriculum of 25 or 30 years ago. I have already said that many changes have taken place in that curriculum and that others are proposed. Perhaps it may be worth our while to make a brief survey of some of the more important changes.

The most important has undoubtedly been the substitution of courses largely or wholly elective for courses completely or almost completely prescribed. There were many reasons for this change. One of the most influential, however, was the multiplication of courses consequent upon the advancement of knowledge and the foundation of new professorships. If English, if French, German, Italian and Spanish, if history, economics, and politics, if the biological, natural and physical sciences were all given representation in the faculty of the university, how could the students be reasonably confined to Greek, Latin, mathematics, philosophy, and the two or three other subjects of the ancient curriculum. The champions of the newer subjects claimed for them equal educational efficiency with the older subjects, if not greater. The result was the abolition of required courses and the institution either of an unlimited elective system or of parallel groups of courses. The former was the more radical solution and it seems to be the goal towards which contemporary changes are pointing. But, however that may be, and taking the present condition of affairs as we find them, it is obvious to the poorest observer that the meaning of an A. B. degree is no longer what it was thirty years ago. Then it meant proficiency in Greek, Latin, and other subjects of the fixed curriculum. To-day college studies have nearly everywhere been made elective, if not for the entire four years of the course, at least for the greater portion of the time. And at first sight it looks as though the idea of liberal culture had disappeared. Many persons, indeed, are lamenting that the sciences in our A. B. course have taken the place of the humanities. And they proclaim that a revolution has occurred and that we are in a state of educational anarchy.

When, however, one ignores superficial phenomena, one will find the changes more apparent than real. The much vaunted physical sciences have not in general attracted large numbers of students in our colleges of liberal arts. For the class graduating with the A. B. degree at Cornell University in the year 1901 our records show that on the average only one-fifth of all studies taken were in mathematics and the physical sciences, the remaining

80 per cent., or four-fifths of the whole, being in languages, philosophy, history and political science. These figures embrace not only the senior year but the entire four years of the course. I believe that these figures are not exceptional and that they are substantially true of other institutions. It follows, therefore, that as in the past so at the present time liberal culture is being realized in our universities through the study of language, philosophy, and kindred subjects. That is to say, it is through the disciplines related to man and not through the disciplines related to nature that our students are being liberally educated. In a word, to-day as in the past, men achieve liberal and humane culture through the humanities. And, as the Greeks conceived it, it is through the study of these humanities that men are humanized.

This is the fundamental, underlying, permanent identity. Along with it there is, however, diversity. For though it is still through the humanities that the modern student is liberally educated it is no longer prevailingly through the classical humanities. Under the present conditions in America tendency is predominantly in the direction of substituting the newer humanities for the older—for Greek and Latin. Dealing with the class already referred to out of every 100 choices of study throughout the four years of their course I find that ten choices were in the ancient languages, eleven in philosophy, twenty-two in history and political science, and thirty-seven in modern languages.

Many conservative educators may feel that the modern humanities are incapable of humanizing and liberalizing the mind of youth. For my own part, I should like to see one of the ancient classical languages form an important element in every scheme of liberal instruction. Under the elective system which generally prevails it cannot be required. But it is encouraging to note that where students have an opportunity of presenting a modern language instead of Latin for admission to our universities comparatively few of them take advantage of the opportunity. This means that Latin has intrinsic merit enough to hold its place in the schools. And I regard it as a very significant phenomenon that during the last few years Latin should, both relatively and absolutely, have made decided gains in the high schools of the United States. As to Greek, no man esteems it as a study more highly than I do. My belief, however, is that Greek is too good for the great majority of students. Unless Greek be studied for a long time, so that one is capable of reading and enjoying the literature as one reads French or German, the educational advantage of studying it is not greatly different from that derived from the study of Latin. Be that as it may, Greek in the elective system in colleges and high schools will be subject to the universal law of struggle for life and the survival of the fittest. I believe it will maintain its place. And although blockheads and dullards will no longer be compelled to make a mechanical grind of it, I believe that so long as human civilization continues the language and literature of Homer and Sophocles will find audience fit though few.

Those who criticize the present tendency of substituting the newer humanities for the older should bear in mind that the Greeks themselves never studied a foreign language, and that if we followed their example we might find the potencies of a truly liberal culture in Chaucer, Shakespeare, Milton, Wordsworth, and the other great poets and prose writers of our own noble literature, to say nothing of French and German literature which have come to be so generally studied in lieu of the ancient classics. In any event I cannot endorse the criticism that current tendencies in liberal education are making it less liberal or less humanistic than of yore. The specific contents of the curriculum may vary. Its humanistic character abides. And whether it is by coming in contact with the literary products of ancient Hellenic genius or the literary products of modern English or German genius the mind of the student is liberalized, enlarged, and elevated. What the human spirit has wrought and embodied in artistic form in the modern world has not less potency than the similar products of ancient genius to thrill and uplift all who come beneath its touch.

A second and corresponding change concerns the A. B. degree itself. When elective courses were adopted Greek and Latin were still required for the A. B. degree and groups of other subjects were formed as requirements for the Ph. B., B. L., and B. S. degrees. These latter degrees were generally of inferior value. The programme of requirements was generally easier and the standards of admission always lower. With the gradual improvement of our university system the entrance requirements admitting to these inferior courses have been raised and equalized with those of the A. B. course; and the subsequent requirements for graduation have also been made substantially equivalent.

These changes having been accomplished the only difference between the requirements for the A. B. degree and a Ph. B., B. S., or B. L. degree was that the former required one-fifth of the student's time for a year or two for Greek and the others a corresponding time for some other characteristic study. Such a differentia seemed a very small affair in comparison with all the other subjects admissible in the four years' course. The next stage consequently was the abolition of all degrees except the A. B. degree with equal though not necessarily identical requirements for entrance and a system of elective studies after admission qualified only by the student's preparation to take any course which he might desire to elect. And, as I have already said, after all these changes have been made, the A. B. degree represents on the average four-fifths of four years' study in the humanities. I repeat that though English, modern languages, history, economics, and politics have taken a large place under the elective system in the student's programme his studies remain predominantly humanistic. Now, as always, the A. B. degree connotes liberal culture.

I desire now to speak of the relation between liberal culture and professional training in our universities. The typical American college had only the Arts course. It had no professional schools and the large majority

of our colleges and universities are still of that type. These colleges scattered all over the country keep alive the torch of learning. They confer liberal education upon thousands and thousands of students within their sphere of influence who would never have gone to a more remote university. The existence of these colleges and the highly important function which they discharge in American education must be kept in sight as an important consideration in discussing the relation of liberal culture to professional training. Indeed I sometimes think that we may have to rely upon these smaller colleges for keeping intact the conception of liberal education. Many of our universities, especially those located in large cities, have comparatively small colleges of liberal arts, while their professional schools are exceedingly large. They become, therefore, interested in professional education and too easily overlook the independent value of liberal culture. Their president and professors come to think of a liberal education as a mere preparation for professional courses. At the same time being crowded with students in the professional courses, they keep advancing the entrance requirements until finally they close the doors to all but college graduates. That stage having been reached, they reflect that the college graduate who has spent four years in a high school, four years in college, and must spend four years more before he receives his professional degree, enters upon his professional practice too late in life. To reduce the age they then propose to shorten the college course, that is, to reduce the time devoted to a liberal education. Some compromise might perhaps be attempted. Some institutions now permit seniors in good standing in Arts to elect for the final year of their A. B. course work in the professional schools. And in most cases, probably in all cases except law, this could be justified on the ground that the elementary professional studies belong essentially to the college of liberal arts and sciences. Not content, however, with this arrangement, it has been proposed to shorten the Arts course from four years to three. It is important to examine the reason underlying this proposal. The controlling factor at any rate is the desire to shorten the time spent on Arts and professional studies. But only a small minority of college graduates take law, medicine, or other professional courses. To accommodate the minority, or rather to get this minority sooner engaged in the active practice of their professions, it is proposed also to shorten by one year the time which the majority devote to a liberal education. I can only say that I regard the proposed change, although it has been made by a university of such high standing as Harvard, with a good deal of anxiety. At Harvard it may perhaps be administered without injurious consequences. For Harvard stands for high scholarship and high standards and it has been steadily advancing its requirements for admission. But even Harvard cannot change the fact, which is a fact of human nature, that for liberal culture it is indispensable that the student shall have attained a certain age and enjoyed a certain leisurely continuity of study. Subjects like philosophy and political science cannot be studied with profit by immature minds and minds are not mature

enough for such work much under twenty-one or twenty-two years of age. Then again duration of time is important. Some studies produce little effect without considerable time for the absorption of material, for meditation, for intellectual reaction. On the whole, therefore, I should be pleased if the nature and conditions of liberal culture were determined without reference to the professional schools. I believe firmly that liberal culture in the old-fashioned sense is essential to our civilization. It is not essential that students of law and medicine should be college graduates before entering upon their course of professional study. And my solution, therefore, of the difficulty is to maintain substantially intact the four years' course of liberal culture and to encourage students entering upon it who are young enough, and who have or can secure means for the purpose, to take both the A. B. course and the professional course; while on the other hand permitting students who enter upon their studies later in life, and who are poor and must earn means for their own education, to enter the professional schools on graduating satisfactorily at public high schools. This is a democratic country. I do not think it just to close the doors of our professional schools to youth qualified to pursue the studies which they offer. And if there is any doubt about the application of this criterion, as I scarcely think there is, it could be removed by applying to the professions themselves for opinions to aid the faculties in determining proper requirements for admission and graduation. Do not misunderstand me. I know that educational ideals should have the primacy. But I would have them illuminated by the views of the members of the profession concerned and by due regard to the rights of American youth who are too old or too poor to take a college course to become members of the legal or medical profession for the studies of which every high school training is a sufficient qualification. That is to say, the justification of a course of liberal training is that it is a cultivation of the man as such irrespective of the profession. This liberal culture makes the larger man. For that reason it is desirable. It is not necessary, however, for entrance upon professional training. The confusion of these fundamental points seems to me to lie at the root of many crude ideas current at the present time.

It has, for instance, been suggested that the A. B. course should be reduced not only from four years to three, but from four years to two, so that students of law and medicine might at the end of their sophomore years as A. B.'s enter upon the study of law and medicine in professional schools which close their doors to all but A. B.'s. And the Deans of professional schools have suggested that it was possible for students in the academic departments of their universities to cover the present four years' course in two years. Nothing could be more fallacious. This is a quantitative view of education which should be immediately banished from all our thoughts and discussions. Liberal culture cannot be forced. It takes time. And to say that freshmen and sopohomores who properly enough take languages, mathematics, and science could also profitably study philosophy and the fundamental principles of economics and politics is to overlook the facts of human

nature. It is very strange that educators themselves should be guilty of the capital crime of supposing that the process of education could be hastened at railroad speed. Liberal culture, as I have already said, is to be obtained by bringing the mind of the student into contact with the best products of the human spirit. Such products are art, language, literature, philosophy, history, politics and physical science. No representative selection from such a curriculum could be planned for a two years' course which would insure the result of liberal culture. No man is liberally cultured who has not steeped his mind in these typical studies, and for effective mental action and reaction the present four years' course is none too long.

I say nothing of giving the A. B. degree for a two years' course. It is a proposal that will meet with no favor. It breaks with the universal practice of the country. But apart from the suggestion of conferring the A. B. on sophomores there is no objection to requiring two years of Arts study for admission to professional courses if any institution is willing to exclude all other classes of students. I am persuaded, however, that neither the University of Colorado or any other State university can ever adopt such a proposal. Here professional training and liberal culture will flourish side by side. And I think that a far happier arrangement than the conception of the college of liberal arts as a preparatory school with a two years' course for the preparation of students to enter schools of law and medicine. This is to abolish the conception of liberal culture as an end in itself, it is to throw away the last half of the A. B. course, and to utilize the first half merely as a means to some ulterior end.

It seems to me that the charter of the University of Colorado wisely describes a different ideal of liberal culture and its relation to professional training. To the realization of that ideal you have with a good degree of success for a quarter of a century addressed yourselves. Throughout the new century on which we have entered I trust your good work may continue. And while you train men as you have done in the past for the different walks and professions of life, hold fast to the doctrine of your charter which upholds the supremacy of liberal culture. For this high mission I bring you the good wishes and prayers of sister universities, as I also bring you their congratulations on the splendid achievements of your first quarter century.

The next speaker introduced was Dr. Joseph A. Sewall, First President of the University of Colorado. Dr. Sewall responded as follows:

REMARKS BY DR. JOSEPH A. SEWALL.

Mr. President, Ladies and Gentlemen: I did not know when I came into the house that I was to say anything to you at this time. I am prepared to speak at the alumni meeting this afternoon, and all of you can see that I

have a sore throat—I can't call it a clergyman's sore throat because I am not a clergyman, but I think it's just as good as any clergyman's sore throat—and so I have but one word to say. I rejoice with you. I congratulate you upon what we have seen here to-day, and what we have listened to, and what we have learned regarding the progress of the University of Colorado. Let me say that in the ten years that I was connected with the institution, there was not an effort on my part, there was not a prayer uttered, there was not a pulsation of my heart, to the best of my knowing, that I did not give to the success and to the building up of the University of Colorado. Having in mind what we have seen and learned here to-day, namely, that the University of Colorado is in fact a University of which every one that has any interest whatever in education in this State is to-day proud, if, in the ten years, I did anything, however humble, however small, to bring about this condition of things, I am content. And to you, the newer members of the Faculty, to you, the older members, who, seeing the mistakes that I made, generously corrected them, and the shortcomings, overlooked them—unto you, I wish to express my heartfelt gratitude for all that you have done to make an insignificant beginning so grand in its maturity.

Governor James B. Orman was next introduced in the following words:

We are especially favored by having the Chief Executive of the State here to-day. His Excellency, James B. Orman, Governor of Colorado:

ADDRESS BY GOV. JAMES B. ORMAN.

Mr. President, Ladies and Gentlemen:—The occasion that brings us together here to-day within the halls of this institution of higher education is indeed a worthy one, and necessarily of a congratulatory nature. We are meeting under most auspicious circumstances. It is with justifiable pride we assemble here to celebrate the Quarto-Centennial of this University; to celebrate twenty-five years of progress of higher education in Colorado, and to rejoice in the steady growth of our State and its institutions to higher and higher levels of prosperity and greatness. Twenty-five years is but a short space of time when considered retrospectively, and when viewing the advancement that has been made in that time, one is almost astounded and scarce can give credence to the fact that from that small beginning has arisen this mighty monument of learning which reflects so much credit upon the State.

From our earliest history the citizens of Colorado have been noted for their progressive and enterprising spirit, and have always manifested a marked degree of liberality and generosity in public affairs, particularly in

matters educational. The earnestness and enthusiasm displayed by the early settlers of Colorado, especially those of Boulder, is commendable. Those men, indeed, builded better than they knew. Near this site the first log school house was erected within the confines of the State, and from these hills on which this University now stands we can overlook the site of that first school house, which represented the humble beginnings of the educational interests in this State.

We are here to pay our tribute to the public-spirited men and women who have earnestly labored for this institution in the past. We are here to rejoice in the years of progress,—a quarter of a century,—in which the officers and citizens of this great State have always labored to advance the institution of which we are all proud. We are here to show our devotion to the cause of higher education and to the institution which is training our young men and women for the highest type of citizenship.

The State University is the crown of our public educational system. Following the grade and the public high schools, it is reached last by the student in his progress to a complete education, and it rounds out and trains all the higher faculties of his nature. It finishes the work that the lower schools commenced, and sends into the world young men and women, earnest in purpose, full of zeal and patriotism, loyal to those institutions that gave them opportunities for training and advancement. The University conserves the cause of higher education, and its influence can be traced in a thousand ways into every avenue of life in our commonwealth.

As the exigencies of the occasion have demanded, the curriculum has been changed so that the University has in all respects kept pace with advanced thought in literature, the sciences and all branches of learning, and those who have gone forth from these halls are as well equipped for the journey of life as those who have graduated from more noted institutions.

The purpose of a University is to train the young men and women of our State to higher thought and nobler purpose. The student's education has not been completed when he leaves his alma mater. It has really just begun. But here young men and women are prepared and fitted for their life's struggle; made better able to cope with existing conditions and circumstances; are given a more thorough and exalted understanding of what is required of them as citizens, and a realizing sense of their obligations and the responsibilities resting upon them. Our young men and women are here receiving one of the greatest blessings within the power of the State to bestow.

We can well imagine what will be when the half century mark is reached in the history of this institution, twenty-five years from now. Within these twenty-five years thousands of young men and women will go forth from this institution, trained for intelligent citizenship, to contribute their influence to the growth and development of our State, and the influence of

this institution will enter into every phase of our life. The University will increase in numbers, in wealth, in equipment and influence, and will attain a high position among all educational institutions, and be a potent factor in all that makes for the future greatness of Colorado.

The University of Colorado has indeed been fortunate in the selection of capable officers to preside over its destinies, whose individual character and whose earnestness of purpose have entered into the making of a great university. The personality of the Presidents of this institution—Doctors Sewall, Hale and Baker,—who were all men of high educational attainments, character and culture, has done much to make this institution of learning one of the best. We appreciate the work they have done. Their efficient management has made possible its continued growth and greatness. Under their able administration and guidance this University has grown to a position of pre-eminence in our commonwealth, and to a place of equal importance with other State universities of our land.

The success attained in the growth of our University is indeed remarkable when the financial difficulties it has passed through are considered. The financial crises have been numerous, but the officers and patriotic friends of the University have rallied to its support. With unflinching integrity and fidelity they have, time after time, overcome obstacles and barriers, which to others seemed insurmountable, and have by their zealous work saved this institution, when to others it looked as if the work already accomplished were to be lost. Continually hampered by reason of lack of funds, nevertheless the growth has been steady and strong. But I am glad to state that I firmly believe that in the future sufficient provision will be made for carrying on the work and future development of this and other State institutions of learning, so that their growth will not be limited or retarded.

I congratulate the officers and Regents of the University upon the outlook for the future; I congratulate those who teach and those who are taught, but above all do I congratulate the people of this State upon the advantages they possess, derived from the University of Colorado.

Following Governor Orman's address there were words of greeting given by representatives of various educational institutions. Several of the delegates were obliged to leave on the noon train, before the close of the exercises, but the following responded:

Rev. Dr. G. A. Brandelle, representing Augustana College, said:

Mr. President, Members of the Faculty, Ladies and Gentlemen:—I presume that quite a number of these delegates are present and desire to address you at this time. In that event, I must set them an example in the matter of being very, very brief. I have the honor, Mr. President, of bringing to you the congratulations and best well wishes of the President, the Faculty, and the students of Augustana College, Rock Island, Illinois.

We are delighted to hear of the progress that you have been making during the past ten or fifteen years. We know that you are going to make still greater progress in the days to come. May God bless you most abundantly, and may He grant unto you grace and strength to do the work that is set before you, that it may redound to the glorification of His name, and to the upbuilding of a nation of young people in this State who shall be tremendously strong, both intellectually and morally.

President Wm. F. Slocum of Colorado College made the following remarks:

Mr. President, Members of the Board of Regents, and Faculties of the University of Colorado:—It is with very great pleasure that I bring to the University of Colorado the greetings and congratulations of the Board of Trustees, the Faculty and the students of Colorado College. It seems to me to-day, as I think with great pride of our University, of the work which it has done in the past, of the work which it is doing to-day, of the great advantage to our whole commonwealth, of what it promises for the future, that we are gathered here to congratulate one another, to congratulate the State, to congratulate all those who love and believe in our University for what it is accomplishing. I am coming from those who conserve the College idea, and I am very sure that in the conserving of the College, we are paying a compliment to the University. We compliment the University upon its graduate courses, upon its law courses, its medical courses, its engineering courses, because we are trying in our courses to prepare our students the better for the work which you are doing, and doing so admirably. We take very great pleasure, and an increasing pleasure, in what is being accomplished here at this University, and I am sure, that as the years go by, and we build up our simple College life, we shall find more and more that we are working together for those high ends, for those noble purposes, that make up the movement for higher education in the State of Colorado. It seems to me also that as we work for that end, as we represent together that higher movement, we are producing in Colorado that unity in the great educational movement that shall accomplish more and more as the years go by for the evolution of our State in every respect. So it is with sincere pleasure, it is with a profound sense of gratitude and respect that I come here to represent Colorado College, bringing these congratulations and bringing that sincere admiration for what is being accomplished and for what your Faculties, your President, and your Board of Regents are doing, not only for the University, but for our whole commonwealth.

President Z. X. Snyder, representing the Colorado State Normal School, said:

Mr. President:—To you, to your Regents, to your Faculty, to your alumni, to your students, to the people of this State, this is a glorious day

because out of education come the issues of life; whether it be the man in the profession, whether it be the mechanic, or the farmer, he ought to be a product of our educational system. I bring the greetings of the Colorado State Normal School to you, and congratulations to you upon the development of this institution, not so much upon its thirteen buildings, not so much upon the objective development, but upon the development of its character, the character of this institution. It has a will; it has a heart; it has an intellect. It stands for ideals, and ideals that are the pioneers of achievement; and to carry out this policy is what will make this institution, not the institution of Boulder, not the institution of Colorado, but the institution of the Rocky Mountain region. As Harvard is the institution of New England, as Columbia is the institution of the Atlantic States, as Chicago is probably the institution of the great middle West, and as Kansas or Nebraska or some other institution, that of the Plains, so it may be the institution of the great Rocky Mountain region. And I believe I am expressing the sentiments of the educational people of this State when I say it is the prayer of this people that you may conduct the fiftieth anniversary of this institution, and that Time may be so kind to you that you will be hale in health and strength—this is the prayer, I believe, of every one.

Dr. Ammi B. Hyde, representing the University of Denver, made the following remarks:

It was my fortune to stand by a tree, the record of which is this: That it burst the surface of the ground when Alfred was King, and, when Edward the Elder was upon the throne, it was a shrub in early and healthful growth. I stood by that splendid growth and thought what storms it had resisted, with what winds it had wrestled, what sunshine had fallen upon it, what dews and rains had cherished its growth, and, as I stood there, it seemed to bear in itself the visible record of that long period, a thousand years. I think that it was something like this which the speaker of old had in his mind when he uttered that hearty wish, that as one's years, so his strength might be. This is the sentiment of the University which I have the honor of representing, towards this institution, and the men who make it up—that, as its years, so its strength may be.

We wish you many long years, the joy of many generations, on this magnificent site with this background and foreground so contrasting and so grand, and this fair town clinging around—here may this institution prosper and its thousandth year be as this year, only far more abundant.

Honorable Joseph C. Shattuck, a former Regent of the University, was the next speaker:

Mr. President, Members of the Faculty, and Board of Regents of the University of Colorado:—I bring to you especially a kindly word of greeting from the Board of Trustees of the University of Denver, whose repre-

sentative I am, but as the institution has been so fittingly represented by my predecessor, I trust you will excuse me for a brief word upon other lines. I devoutly thank God that I have lived to see this day. I knew the University of Colorado at its very beginning, when it was a tottering, trembling infant. I am glad to greet it to-day, a full grown young man, rejoicing in the strength with which it is starting to run its race. I knew it when it was hardly known outside of the county in which it was situated, and the counties immediately surrounding. I am glad to greet it to-day, when its fame and its credit are not limited by the bounds of our own common country.

There is an old friend living here in Boulder. I haven't met him to-day, the Honorable James P. Maxwell. The younger people may forget, and so I say to you, lest we forget, to that noble man more than to any other, perhaps to all others, you owe the first appropriation that was voted out of the public treasury, the Territorial treasury. In 1874, I had the honor, and it is an exceedingly pleasant memory, to sit beside Mr. Maxwell in the Territorial legislature, and help him, as best I might, in fighting that first appropriation of $15,000 through, in spite of opposition and improbability of success.

The institution of learning organized here twenty-five years ago entered the only door of education that was open. It has been busy since then opening doors, doors that have let it in to lines of education, as President Schurman so beautifully marked out, in close sympathy with the people, educating young men and women, not exclusively in the old branches which made a liberal education twenty-five years ago, but in those which bring them into touch with the people among whom they must live. I give honor to those who laid the foundations here. I rejoice in those who are enjoying the fruition of the hopes of the founders and I close with the sentiment from George MacDonald: "The old days will never return, because they would be in the way of the new and better days, whose turn it is."

Judge Owen LeFevre spoke from his place in the audience as follows:

Dr. Sewall, who was appointed by President Angell with myself to come here to represent the University of Michigan, did what may be always expected of a member of a Faculty, insisted on somebody else doing his work. Last night, he insisted that I remain indoors because I was not well, and this morning, with a characteristic which is found among Faculties, he insisted that I take the train in a snowstorm to be here. So in order to convey the good will of my own Alma Mater, and to do that which President Angell, the friend of all students, and especially of his own boys, has asked, I am here to give you the greeting of a sister institution which has struggled through more years of adversity than this, which had for years a greater hardship in the then Northwest than you have in the Rocky Mountains, and yet to-day stands perhaps foremost of the educational institutions, the co-educational institutions. She has grown with her years, and

she extends to you the same cordiality that she has met with as a State institution, supported by the people. Mr. President, to have done all that you have done certainly means great honor to yourself and to those who have represented you, as well as your associates.

Professor Laurence Fossler of the University of Nebraska responded in the following language:

Mr. President, Members of the Faculty, and Friends:—I come out here as a man of the plains to the men of the mountain, and women of the mountain, too, to bring you the hearty congratulations of our institution. We met you a few weeks ago, and we intend to do so again. I come out here this morning to join in a regular love feast. A few years ago, some five or six years ago, we were celebrating a similar occasion down at Lincoln, and we too, had expressions of kindly feeling, of congratulation on what we had done, and I think we deserved it just as much as you do. I come out here, and I find that the same spirit of broad, liberal love for the higher things in life is extant in the State of Colorado. I was told when I came out that I should not fail to take the car, "Seeing Denver," because in that way, I could see the whole city for a quarter and have a guide thrown in, and I availed myself of that opportunity. The guide certainly knew his business pretty well, for he pointed out this millionaire's residence, and that millionaire's residence, and he told me how many millions this block cost, and how many millions that block cost, and how many miles of street cars they had, and in fact, my head fairly swam with the figures he gave me. I jotted some of them down that I will produce when I get back home. And yet, ladies and gentlemen—I think I am speaking the sentiment of you all—I am convinced that it is not millions, that it is not street railways, that it is not blocks, that it is not gold mills, that it is nothing of the sort that makes life really worth living, but it is the work such as is done by your institution and by our institution and by all the institutions of similar grade over this broad land. It is the spiritual things of life, the love of truth, those things for which this University stands, that make life worth living. I rejoice to hear the admirable report which we have had of the progress that the institution has made, because it shows that the people of the State of Colorado are appreciating what is being done, and in twenty-five years from now, yes, in ten years from now, you will find that the graduates of this institution will have pushed into the professions, will have pushed into the legislature, will have pushed into business everywhere, and thus they will give a moral tone, an intellectual tone, an artistic tone to society of the commonwealth of the State of Colorado, which will repay a thousand-fold for the money that she is putting into their education. Mr. President, I again repeat that both the University and myself personally extend to you, and to your faculty, our heartiest congratulations.

Lieutenant-Colonel J. W. Pope, representing the United States Military Academy, spoke as follows:

Mr. President, Ladies and Gentlemen:—It is entirely fitting that an institution like West Point Military Academy, which has sent out so many of those officers of the Army who have distinguished themselves in the long struggle resulting in the "Winning of the West," should be represented at the Quarto-Centennial Celebration of one of the greatest institutions of learning in the rapidly developing section of the Republic. West Point makes no exclusive claim to the honor due to the United States Army for its patient, arduous, and laborious work in the long battle of civilization, but its martyrs to that cause dot the plains from the Canadian border to the Mexican frontier.

I fear we are accustomed to over-estimate the relative value of the abounding evidences of present and recent achievement, in all directions, but you men of learning must know that, as it is the mysterious working of nature's forces upon the unpretentious seed in the dark and damp of the unseen underground, which chiefly brings forth the beauteous flower and fruitful grain, so it was the hard, rough task performed by the rugged pioneer, aided by the strong arm of the soldier, which prepared the way for the present high stage of development of the Great West in the arts, sciences, and industries.

For eighteen years, as a Lieutenant of General Miles' regiment, the Fifth United States Infantry, I was identified with the fighting force of the Army in the West. My first station was Fort Lyon, Colorado, and within a few months, I joined the expedition of Carr and Penrose, which lasted during the winter of 1868-9. In the summer of the latter year, came the expedition from Kit Carson, Colorado, against Indians who had murdered workmen of the Kansas-Pacific Railroad; afterwards my company guarded that road when the so-called Denver Extension was completed to Denver. In 1873, my company was sent to quell an Indian disturbance on the Cucharas at the foot of the Spanish peaks. In 1874-5, we were engaged in the campaign under Miles against the combined tribes of the Indian Territory Indians which lasted nearly a year. In 1876-8, we were at war with the Sioux and Northern Cheyennes, following the Custer massacre. All this is only a fair sample of a regular army officer's life in those "piping times of peace."

Such work must have engaged the interest of the Army officer in the field of his labor and, together with most of the line officers of the Regular Army, my interest has ever been with the Great West. So when my friend, Colonel Mills, Superintendent of the United States Military Academy at West Point, requested me to represent our renowned old Alma Mater at this Quarto-Centennial of the great University of Colorado, it gave me genuine pleasure to come and tender the greetings and congratulations of that old and distant institution to this comparatively new but flourishing University of one of the most progressive States of the Union.

I do this with all sincerity, knowing that such felicitations must be appreciated as coming from an institution which has sent forth so many of its alumni to water with their blood these fair plains to see spring forth from the sacrificial altars of their graves, not armed men, but noble institutions of learning, great manufacturing establishments, and all the arts and industries of peace.

Mr. Van Rouse, representing William Jewell College, responded as follows:

I will speak from the floor, if you will excuse me. For twenty years I have been connected with the school interests of the State of Colorado. My work has been in the public schools. I was here when this building first cast its shadow. I have been connected with the State's educational interests ever since that time, and to-day I am closely connected and allied with the institutions at Colorado Springs, and it gives me great pleasure, Mr. President, to offer the congratulations from my Alma Mater for the success and the continued success of this institution. I thank you.

President Baker asked Professor Jackson to say a word for the University of Wisconsin, in addition to his address of the day before.

Professor Dugald C. Jackson, of the University of Wisconsin, made the following remarks:

Mr. President, Board of Regents, and Ladies and Gentlemen:—I come from a University which recently completed its second quarter century, a University like this, practically framed in the Constitution of the State, and supported by it, a University which went through days of darkness and struggle, which I am sure this University has met, but which has come to a stage of accomplishment that may be emulated by all of our State Universities. I find here,—I had never visited here—but I find here the same democratic spirit for scholarship among the people, which has given the State Universities a place in the hearts of the people and has made these Universities a power for good. I met you first as a stranger, or I thought I did, but was greeted by the slogan which is recognized as the yell of the University with which my teaching life has been connected, a slogan which has become practically that of a great State, a sister State, and I must say that I felt that I was amongst friends. Under such circumstances, I am particularly pleased, Mr. President, to congratulate this University upon its great past, upon the achievements that it has brought forth in the past, upon its position in the present, and particularly also to add our hopes and our kind wishes for those things which we know are coming to you in the future, and which you will bring to this great State of the Union, and to the nation.

President Baker announced that our own Professor Brackett had been selected to speak for Yale.

Dr. Brackett spoke as follows:

President Hadley would gladly be here in person to convey the heartiest congratulation of the officers of Yale to the Regents and Faculties upon the completion of twenty-five years of remarkably successful work in the interests of higher education. The relations between the two Universities have been very cordial. He remembers with pleasure the services of each University to the other. Yale is the Alma Mater of Mr. Charles Rowland Dudley, whose labors for the University have been conspicuous in the Board of Regents, while at least three of her graduates, including Professor Maurice E. Dunham and Dr. Charles G. Osgood, have been members of the University Faculty.

He remembers, too, that the debt is not all on one side. He bears in mind students from the University of Colorado who have won distinction at Yale, as Mr. Charles Studinski, the intercollegiate debater, and Mr. Eugene Heitler Lehman, a writer and speaker of rare power. He does not forget the services of the late Guy Van Gorder Thompson, Ph. D., instructor and tutor in Latin at Yale from 1892 to 1897, and a most respected member of the Yale Faculty. Dr. Frederick Lincoln Chase, the assistant astronomer of Yale University, also received his education at the University of Colorado, and both by his character and ability as a scholar has reflected great credit upon his Alma Mater.

Rev. Theodore T. Munger, D. D., senior member of the Yale Corporation, adds to his congratulations these words: "I have always felt that there is no better place for a man to serve his country and the kingdom of God, than in a Western University. You certainly are near the center of the country and at the top of it."

Yale having rounded her two hundred years sends greetings and congratulations to Colorado upon the completion of twenty-five. The ocean rejoices in the young glory of the highland; the highland needs the deep, and the deep needs the highland.

Mr. Frank E. Shepard, representing the Massachusetts Institute of Technology, spoke as follows:

Mr. President:—I wish to convey to you, the members of your Board and Faculty, the cordial congratulations of the Massachusetts Institute of Technology of Boston, Massachusetts, and its President Mr. Henry S. Pritchett. Mr. Pritchett wrote me recently, expressing his great regret that he could not be here on this occasion. This institution stands for the education of engineers, and interests in the practical arts and sciences. It has sent out a great many graduates to this State, and we are rejoiced, as engineers, that there is an institution here which will allow the young men

of our State to become more proficient in the practical arts. I am very glad to convey to you these cordial congratulations from Massachusetts.

Dean Hellems announced as follows:

Owing to lack of time, I omit most of the letters that I had hoped to read to you. Most kindly and cordial expressions of regret were received from President Roosevelt, Dr. Harris, the Commissioner of Education, and from eminent statesmen, educators and churchmen throughout the country. Nothing, I think, could be more gratifying than the attitude that has been assumed by every friend towards our celebration. At the request of the Faculty, I will read two or three rather typical letters, one from President Northrop of the University of Minnesota, one from the President of the Ohio State University, one from President Angell, the veteran head of the University of Michigan, and one from President Jesse of the University of Missouri. President Hadley of Yale sends an especially cordial letter. A genial greeting from the Reverend Dr. Caverno, an old and staunch friend of the institution, is particularly welcome. I should like to say that if there ever was any feeling, even of hesitation, on the part of the clergy toward the State University, judging by the letters received from clergymen who could not be present, the feeling has entirely vanished and clergymen recognize that education and life are one, and that the State University, while working out the problems of education, is working out the problems of life and religion as well. I will close with a most cheerful letter from Dr. T. W. Stanton, of the Class of '83.

SATURDAY AFTERNOON

THE ALUMNI DINNER

TOASTS.

Toastmaster: RICHARD H. WHITELEY, Class of '82.

"Welcome the coming, speed the going guest."

—*Homer.*

The Pioneers of Colorado.....MR. HUGH R. STEELE

"By the work one knows the workman."

—*de la Fontaine.*

Early Struggles for a University at Boulder.....

.....HON. JAMES P. MAXWELL

"When the fight begins within himself
A man's worth something."

—*Browning.*

The First Ten Years.....EX-PRESIDENT JOSEPH A. SEWALL, LL. D.

"While there is life, there's hope, he cried."

—*Gay.*

The Future of the University of Colorado....HON. DAVID M. RICHARDS

"There's a good time coming, boys!
A good time coming."

—*Mackay.*

Mr. Whiteley, presiding as Toastmaster, spoke as follows:

Not to interfere with the closing up of the lunch, and yet to obtain all the time possible before trains and such worldly affairs, I desire to open the ceremonies and to recall the words that we learned in the University of Colorado before the beginning. The old master said, at the feast of his day, when Agamemnon and Achilles were fighting their troubles at other times than after they had satisfied their hunger, "First the feast, and then the council." We come now to the council.

In the beginning, when Adam and the class of '82 were without competitors, I can recall that my class felt that when we had a Professor of all the sciences, Dr. Sewall, and a Professor of all the languages, Professor Dow, and a text book on Modern Languages, until Miss Rippon came to act as Professor of all the Modern Languages, that when we had Professors of such broad attainments, naturally we had students of broad attainments

likewise. So it is, that when I think of the class of '82, I realize that they have had no real competitors. I can see that naturally the Faculty and the class traveled in double harness, and I can realize, when I look into the rear of the World's Almanac and see my name, by some ghastly joke there inscribed as the oldest living graduate of the University of Colorado, that they are giving, at this Quarto-Centennial of the University, respect to years, of course. Not to detain you by telling of excellencies that all of you must see, when you meet a member of the class of '82, I pass to remind you that in the beginning there were people who ruled themselves before they were ruled. I speak now of the pioneer days of Colorado, because, remember, they tell me, and with a semblance of fact, that there were men in the State before the class of '82, and it is of those men that we are going to hear to-day. I can think, perhaps, of what is known as provisional governments, of which the United States has had but one, and I am reliably informed Colorado had one. It was organized in the fall of '59, by our sturdy pioneers. Later, you may recall, in '61, or thereabouts, the Government at Washington arranged things for us, but we got together and selected a ruler, a governor, a provisional governor, the first, the only "E pluribus unum" as we would say on the shield, and that provisional Governor was Robert W. Steele. He served his term well, and served more days, and was finally called to higher jurisdictions. But he left a son, and that son has been selected by those who were here back before the class of '82, in '59 and '60, aye, even in '58, perhaps in a tent or a camp wagon. They have formed the Pioneers' Association of Colorado, which association has selected a President, and that President is Hugh R. Steele, the son of our Provisional Governor, who is here to-day, and will tell us something of the pioneers of Colorado. Mr. Steele:

Mr. Hugh R. Steele responded to the toast, as follows:

Mr. Toastmaster, and Ladies and Gentlemen:—At a meeting of the Colorado Pioneers' Society held in order to act upon a courteous invitation issued by the Regents of the State University, two delegates were chosen to represent that Society upon this occasion. I had hoped that my colleague, who was selected, would be here at this time, in order to respond to this toast. General Frank Hall, of Denver, was selected as the other delegate, and only his arduous duties there, I am confident, have detained him from being here on this occasion.

Ladies and gentlemen, I have been assigned an important subject, and I realize my shortcomings, as never before, in attempting to respond to the subject, The Colorado Pioneers, and with it the sentiment, "By the work one knows the workman." Ladies and gentlemen, so far as the work of the Colorado Pioneers is concerned, the evidence is all around you. Their monuments extend from the boundaries of the north to the boundary line of the south. Our magnificent cities, our railroads that span the State in all directions, the opening up and development of every industry in Colorado,

aye, the building of this magnificent University, are all of them monuments to the foresight, the perseverance and the energy of the men who laid the foundations of this magnificent commonwealth.

Ladies and gentlemen, if you could have seen this country when these men and women arrived at the base of these mountains! A more sterile looking and more uninviting prospect it would be hard to find. But these men and women who came here brought with them the energy to found a new State and a new commonwealth. As the beaver, when removed from its native haunt to a strange location, will immediately set about to secure the materials to build a new dam and a new home, so these men and women who came here to the base of these mountains, with that instinct that belonged to them as a people, at once set about to lay the foundations for a new government, and to found those institutions characteristic of our civilization. Within a few months after their arrival, a form of government had been created. They felt the necessity of this, as they were five hundred miles from the boundary of civilization. Within a short time after this, an act was passed by their local Legislature, setting up a University for the Territory of Colorado. Out of this little beginning has grown this magnificent institution, whose twenty-fifth anniversary we are celebrating at this time. I congratulate you, ladies and gentlemen, I congratulate the people of Colorado, upon this, the twenty-fifth anniversary of the opening of this institution, and I trust, ladies and gentlemen, that you will pardon me, if the Pioneers of Colorado assume to themselves some of the credit that certainly belongs to its upbuilding. It certainly is wonderful; it certainly is magnificent that in forty-four years of existence of this Territory and State, such grand results have been achieved. I assure you that the Association to which I belong, the Pioneers of Colorado, are especially proud of this institution. Residing here, as the pioneers have, during all the period of the existence of this University, they have seen as perhaps no other portion of the population of Colorado has seen, the struggles through which this University has passed. They have noted with chagrin and regret the occasions when the University seemed to have been almost upon the point of going upon the shoals of dissolution, and felt indignant that it was at times almost forced to shut its doors for lack of support. Let me, on behalf of the Pioneers, hope that at no future time the occasion may ever arise when the people of the State, and the Pioneers also, may have any cause to feel alarmed that this institution shall fail to receive the support to which it is entitled. And now, ladies and gentlemen, let me say a word as to the future of this institution, because it, different from the society to which I belong, has a long future before it. The University of Colorado will exist and will prosper, I trust, when the Pioneers of Colorado shall have passed away. Let me hope that in the future, instead of thirteen buildings that now adorn these grounds, and instead of a few hundred students here attending, the day may come when this campus shall be covered with buildings from end to end, when thousands of students shall gather here. And,

as they wander over these grounds, I trust they will remember the men who laid the foundations for the upbuilding of this institution. I trust that as the days and the years pass on, this University will flourish gloriously, and that each and every one of the students gathered here will be able to say from his heart, "Thank God that I, too, am an inhabitant of the State of Colorado, and a student of the University of Colorado."

Following Mr. Steele's remarks, Mr. Whiteley spoke as follows:

I am reminded by the speaker that there were men before Adam and the class of '82. I am reminded, too, of one of our old colored ministers who was graduated from slavery into the pulpit, and was teaching some of his flock something of those early days back with Adam and us, and he said, "When de Lawd made de fust man, he set him up agen de fence to dry." "Who made dat fence?" came from the rear. "Put dat man out. Such questions as dat will destroy all the theology in the world." But it seems there were men who made the fence, and to them, the class of '82 freely pays its tribute.

I regret, indeed, more than I can convey to you, that there are disappointments of to-day, as well as of yesterday, when the class of '82 were expecting appropriations. One of these comes upon us in missing from our circle, the Honorable James P. Maxwell, to whom so glorious a tribute was paid this morning, and I can assure you that when you fail to see Mr. Maxwell here, you can be certain that no engagement of business, or of pleasure, could have called him hence, but one of those impossible, almost inscrutable, accidents or concurrences that demand his presence.

Perhaps I may be allowed to use a moment of Mr. Maxwell's time in speaking of the things we learned back in the early days. Duty, good citizenship, was taught by those men, back before the Flood, with the class of '82, obedience to law and respect to those in authority—an easy lesson to early students, because of the lovable nature of those above us. And so well was it learned that though the precepts of the class room have in great part faded from our memories, the respect for our teachers which ripened into love, was so deeply implanted that Time has been impotent to tear from it a shred of its color, or a trace of its vigor. The pioneer President of the University of Colorado—the heart of every pioneer student will respond with throbs of harmony to the sentiment: "May you never hear of trouble until you are wanted at its wake"—Dr. Sewall, the first President of the University. It matters not how broad may spread the branches of our Alma Mater, there can nothing develop of grandeur or beauty that was not inherent in the acorn you planted, Dr. Sewall.

In response to the toast, Dr. Sewall spoke as follows:

Mr. Toastmaster, Ladies and Gentlemen:—I am asked to respond to this toast, "The First Ten Years of the Life of the University." The first ten years of the life of the University saw—

"iron dug from central gloom,
And heated hot with burning fears,
And dipt in baths of hissing tears,
And batter'd with the shocks of doom."

That's what Tennyson says life is, and if it is true, the University of Colorado, in its first ten years, saw a most strenuous life. And if you were to ask me, my friends, what ten years of my life were most filled with sadness, disappointment and sorrow, it is the years that I spent here upon these grounds. Not without the glorious beams of sunlight of which others spoke, but on the whole, they were somber. I tell you that there were a great many things you all ought to know that I haven't time to tell you. I know that I sat upon the stone of these grounds and thought of what Peter Gottesleben said, "I pity Dr. Sewall." "Why?" said his friend. "Because he must either be God or fail." "Why?" he said again. "Because if he succeeds, he's got to make something out of nothing." It was a little irreverent, but I sometimes think it was almost logical. Now, I have sat there and thought about the prospect, and have read the letters from our friends back where I came from begging me to come back to the old institution, until I would reflect and say, "No, that would be cowardly, and what there is before you—" well, and then—the tears would come, and I couldn't help it. I know it was foolish. It was wasteful of water, and you know the wasting of water in this country is an absolute crime. I can tell you what I never told any one in my life before, not even members of my own family. I used to think, "How shall I get out of this? I can't see a bright future." And I couldn't. I will be honest with you. I couldn't. I tried to be hopeful, but it was bitter work, but there was one thing that I derived a great deal of consolation from. The family to which I belonged consisted of six members. They all died but myself before reaching the age of fifty, and I said, "Well, here I am forty-seven, going on forty-eight, and I guess there will be a way out of it after all." I tell you there were a great many troubles that you know nothing of, and a great many things for which I am thankful. I shall never cease to be thankful to the Boulder people who loaned the planks that built the platform upon which stood the class of '82. I remember another year after this class graduated, one of the members of the graduating class, having passed his examinations all very well, came to me and with a very sober look, said, "I shall not be able to graduate." Said I, "Why, sir? Why? What's the matter?" And he put in the same excuse that Adam did when he and Eve had been caught in that apple eating affair. He complained in the same way, "Nothing to wear." It was very important, because if he had failed to graduate, just one hundred per cent. of the graduating class that year would have failed to stand upon the platform. Well, I told a good lady friend of mine, God bless her, and so when Tim stood up there, his suit was just as black, and as well fitting, as any graduate could have, and I have been told that Tim has worn that suit for a dress-up suit ever

since, but I couldn't say about that. When I think of those boys, when I think of Tim, I say, "You are rewarded somewhat for all that labor." I want to tell you about Tim. When Tim digs into the ground somewhere among the shale, and he has found something, and he says, "This is 'Inoceramus,'" all the paleontologists of the world simply bow and repeat 'Inoceramus.' Tim Stanton said so, and that ends it." But summing this all up, I told you there was a great deal of sunshine, notwithstanding the clouds. In the ten years that I was connected with this institution, I never received anything from any student but kindly, hopeful, cheerful, encouraging words. I wish that every one of them might be here, that I might pour out my whole soul to them in thanksgiving for all the kindly words they have said to me during those ten years, and isn't it something to be proud of? I don't know that I had anything to do with it, and yet, I feel it is something to be proud of, to be the head of an institution that has turned out so many men that stand high in the educational world, that have won a State or even a national reputation. I say the University of Colorado has furnished more such men in proportion to those that have attended the institution than Harvard, or Yale, or Columbia, or Michigan, or all of them put together, in the last twenty-five years, and I say that is something to be proud of. What I have to say about the past—there is a big gap, and I think the toastmaster made a mistake, perhaps, in calling upon me to speak of the past. He should have called on some elderly gentleman and let a young, bright, hopeful man like myself speak for the future, because there is something inspiring in the thought of the future, and it is to the future that we all look and hope for great things. Especially, young men, let me say to you, that the development of the University of Colorado, in the last twenty-five years, or say fifteen years, has been wonderful. Let me say a word, what I meant to have said when speaking of the discouragements. One thing was the keeping up the name and reputation of our institution of learning called a University. Once there was a man down in Southern Illinois, of not much account, and he started a tavern, got a log cabin on the cross roads, and put up a sign "Tavern." He waited three weeks. By and by a man drove up horse-back, jumped off, and said, "Put my horse in the barn, and give him some oats." The man said, "Stranger, we don't keep oats." "Oh, well, never mind, give him hay." "Stranger, we don't keep hay." "Well," he said, "do the best you can. And give me some ham and eggs." "Stranger, we don't keep ham and eggs." "Well, then a bowl of bread and milk will do." "We don't keep bread and milk." "Well," said the man, "What in —— do you keep?" "Keep?" he said, "Don't you see I keep tavern?" I say that is very much the condition that we were in. A stranger comes—"Like to see your library." "Well, stranger, we haven't got a library." "I would like to see your apparatus, physical apparatus." "Well, stranger, we haven't got any physical apparatus." "I would like to see your chemical laboratory." "Well, stranger, we haven't any chemical laboratory." "I am interested in Greek. I would like to hear your class in

Odyssey." "Stranger, we haven't any Odyssey." "Well, what in thunder have you got?" "Got? Why we have got a University."

I wanted to say just one word more, and I will be through. As the time goes on, events culminate very rapidly, and the world is going to see greater changes in the next fifteen years than it has seen in a hundred, and what is wanted, and what is needed most of anything that I know of, is directed minds. We do not need the brute force. We do not need the impulse. That is given, that is already furnished. Instinct itself furnished it, but the world, the masses of the world are waking up to this idea. What is wanted is a man, strong, broad minded, directed,—a man that no influence can turn from the right; a man that is strong, and so transparent that every hod-carrier can see right through and through him, and such men, in the times that are coming, and are near at hand, are worth millions of dollars to this community and to this State. And so, the last word that I may say to you (I have spoken longer than I intended), is, be good, be straight, be earnest, be honest, be strenuous, and then, when you have seen the results of your labors as such men, and when you reflect that much of the impetus of such a life, comes from the institution here, then you can, on your dying bed say, "I am thankful for what was put into me by the Faculty of the University of Colorado."

The Toastmaster next said:

Again we meet a disappointment. While I must condole with you on the absence of the Honorable David M. Richards, who was to address us, and is detained by sickness, I congratulate you that I have the nerve, not to speak of the will, to call on General Irving Hale to respond to the toast, "The Future of the University of Colorado."

General Irving Hale responded as follows:

Mr. Toastmaster, Ladies and Gentlemen:—I am not in the habit of starting in on an extemporaneous speech, on which I have devoted two or three weeks of preparation, to apologize for my unprepared condition, but in this case, I can truthfully say for once that I had no idea of saying anything when I came here. I am very glad to be with you on this occasion. The University of Colorado is very near to my heart, on account of its entire history, on account of the early labors of my old friend, Dr. Sewall, in starting it into existence, and providing for it through the early and tempestuous stages, on account of the great work of my old High-School teacher in Denver, Dr. Baker, who has brought it up to its present state of high efficiency, and also because of the fact that my father gave to this institution the last five years of his educational career, and did what he could, did his share in placing it upon a solid foundation. I congratulate you most cordially on the splendid growth of this University, and on this exceedingly pleasant celebration, which you have just concluded, and which began with two days of golden sunshine, typical of one of the colors of

your University, and has ended on the last day with the other color, the silver of the freshly fallen snow. Mr. Steele's reference to the early days and the condition of this country when the pioneers came here, and also Dr. Sewall's relation to the early struggles of this institution, remind me of that story that Col. Ingersoll used to tell in one of his lectures. He dreamed he died and went to Heaven, and he wandered around the golden streets and crystal palaces. They didn't exactly strike his fancy, and he began to make inquiries about the other place, and asked if there was any way of getting there. They said, "Oh, yes, the electric cars run every half hour." So he jumped on an electric car and went over, and found the most delightful place, roses and fountains and rivers, and he traveled along and met two men and got into conversation with them, and found they were Voltaire and Paine. He said, "Why, this isn't such a bad place after all." "Oh, no," they said, "Not now, but you ought to have seen it before we came here."

This subject, The Future of the University, might, I presume, be considered a very easy one, for the reason that when a man talks of the past, he must confine himself to facts, but when he talks of the future, he can give his imagination free rein, but as I must catch this 4:20 train, you are guaranteed against the imposition of any long address. I will not attempt to enlarge upon the benefits and requirements of education, all of which have been so fully and eloquently discussed, both this morning and this afternoon, but I think perhaps they can be summed up pretty well in a remark of that eminent educator, Mr. Dooley, in his imaginary address to the College Presidents. He said, "Your education has not destroyed all the evils of the wurrld, and nobody asked you to." And in reply to Mr. Hennessey's question, "Do you believe in education," he said, "Yes, but not as a dhrug." And so I think we all agree that education is not a drug, a cure of the diseases and ills of mankind, but it is the food and exercise which builds up the brain and leads it into a healthy and active life, and that is the province of this University. As for its future, we can only say that it is commensurate with the future of this great Western country. There is no need of expanding on the great resources of this region. We all know them. We have the precious metals, gold and silver, the other metals, lead and copper and iron, and great coal beds and building stone and brick and timber and cattle and agricultural and horticultural facilities which are limited only by the limits of irrigation (this, by the way, is part of the speech that I prepared for the Real Estate banquet last Monday night). The province of this University, and of our entire school system, is to educate and turn out men and women who can develop all those resources and more. We want engineers to build railroads, and tunnels, and to get the metals out of our mines. We want lawyers to get the miners and the farmers out of their difficulties, or get them into them. We want doctors to treat the invalids who come to us from Eastern states. We want ministers. We want all the professions, but more perhaps than all that, we want to turn out men

and women who will go forth into every walk of professional and business life, and will disseminate through the entire mass the leaven of education and intelligence, men and women who will not only develop our resources and make this Western country great in a material way, but men and women who will raise the standards of citizenship, who will give us good government, and who will make this Western country truly typical of Western Americanism.

Mr. Whiteley closed with the following remarks:

It now becomes my duty to offer a word of felicitation on the fact that we have those who might be heard from, of the University alumni. Regretting that we cannot receive something from some of the brilliant lights kindled at these altars, I can say to you, perhaps in the language that I would use were I dismissing a banquet of Greek letter society men, in the language of the widow's inscription on the monument above her deceased husband's grave, "Rest in peace until we meet again."

DELEGATES.

The following institutions appointed delegates to attend the Quarto-Centennial celebration:

Augustana College, Illinois—Rev. Dr. G. A. Brandelle.

Carlton College, Minnesota—Rev. W. S. Hunt.

Central College, Missouri—Mr. T. Berry Smith.

Colorado Agricultural College—President Barton O. Aylesworth, A. M., LL. D.

Colorado College—President William F. Slocum, D. D., LL. D.

Colorado Normal School—President Z. X. Snyder, Ph. D.

Colorado School of Mines—President Charles S. Palmer, Ph. D.

Columbia University—Frederic S. Lee, Ph. D., Adjunct Professor of Physiology.

Cornell University—President Jacob Gould Schurman, D. Sc., LL. D.

Leland Stanford Junior University—Martin H. Kennedy, A. B.

Massachusetts Institute of Technology—Mr. Frank E. Shepard.

St. Louis Law School—Frederick N. Judson, M. A., LL. B.

United States Military Academy—Lieutenant-Colonel J. W. Pope, U. S. A.

University of Chicago—Frank Frost Abbott, Ph. D., Professor of Latin.

University of Denver—Ammi B. Hyde, M. A., S. T. D., Professor of Greek; Hon. Joseph C. Shattuck, Ph. D.

University of Idaho—President James A. MacLean, Ph. D.

University of Iowa—Chief Justice John Campbell, M. A., LL. B.

University of Maine—Mr. Frank E. Kidder.

University of Michigan—Judge Owen E. LeFevre; Henry Sewall, A. M., M. D.

University of Missouri—President Richard H. Jesse, LL. D.

University of Nebraska—Laurence Fossler, M. A., Professor of Germanic Languages.

University of Texas—William M. Wheeler, Ph. D., Professor of Zoology.

University of Wisconsin—Dugald C. Jackson, C. E., Professor of Electrical Engineering.

William Jewell College, Missouri—Mr. Van Rouse.

Yale University—Professor J. Raymond Brackett, Ph. D.

HISTORICAL DATA.

The University opened September 5, 1877, with two instructors and forty-four students. Dr. Joseph A. Sewall was President, having been elected on the 28th of the preceding March. There were two departments, Normal and Preparatory. In later years the Normal School was dropped and the Preparatory School removed from the Campus and given a separate organization, grounds and building.

The bill for the establishment of the University was introduced in the House October 26, 1861, by Hon. Charles F. Holly of Boulder County. In 1868 substantially the same bill was re-enacted.

On January 29, 1870, the Trustees met at Boulder and organized under the law.

In 1871 the University Campus, fifty-two acres, was donated by Marinus G. Smith, George A. Andrews and Anthony Arnett, all citizens of Boulder.

In 1874 the Territorial Legislature appropriated $15,000 for the University, on condition that citizens of Boulder would subscribe and pay into the treasury an equal sum. This condition was met and in May, 1875, the entire $30,000 was placed to the credit of the University. In March, 1875, Congress had set apart seventy-two sections of public land within the Territory for a University endowment fund. In the following September the corner stone of the present Main Building was laid with imposing ceremonies; in April, 1876, this building was completed and formally accepted.

The Constitution of Colorado, adopted in 1876, provided that the University should become an institution of the State. The first General Assembly provided for its organization and set apart a one-fifth mill levy for its support. On December 26, 1876, the first meeting of the newly appointed Board of Regents was held in Governor Routt's office in Denver. At this time the population of the State was 135,000 and its assessed valuation was $44,130,205.

In 1878 a Collegiate department was opened with ten freshmen. A Classical Course and a Scientific Course were offered; a Latin-Scientific Course was added three years later.

In May, 1882, the first degrees were conferred: D. D., W. E. Hamilton; B. A., Henry A. Drumm, Oscar E. Jackson, James J. McFarland, John J. Mellette, Harold D. Thompson, and Richard H. Whiteley.

The Medical School opened September 5, 1883.

November 5, 1886, Horace M. Hale was elected President, to begin service July 1, 1887.

Woodbury Hall was opened September, 1890.

The Hale Scientific Building was partially completed in 1891.

In January, 1892, James H. Baker entered upon his duties as President.

In September, 1892, the Law School opened, Judge Moses Hallett being Dean.

In the fall of 1893 the School of Applied Science opened, Henry Fulton being acting Dean.

April 16, 1898, the Engineering Building, Chemistry Building and Gymnasium were dedicated.

November 19, 1898, the University Hospital was dedicated.

September 2, 1902, the Library Building was begun.

The departments of the University are the College of Liberal Arts, the Graduate School, the School of Applied Science, the School of Medicine, and the School of Law.

There are thirteen buildings: Main, Library (in process of construction), Hale Scientific, Engineering, Chemical, Medical, Anatomical, Hospital, Woodbury Hall (men's dormitory), Cottage Number One (ladies' dormitory), Cottage Number Two (ladies' dormitory), Gymnasium, and President's House.

The enrollment of students for the present year is estimated at 550 in the University and 375 in the State Preparatory School; total 925. There are 105 professors, lecturers and instructors.

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