SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE OFFICIAL NOTICES AND PROCEEDINGS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

FRIDAY, JANUARY 1, 1909

CONTENTS

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SCIENCE AND THE PRACTICAL PROBLEMS OF THE FUTURE[1]

THE end of the world has long been a favorite subject of speculation. The ancients and our forefathers of the middle ages were pleased to imagine some sudden final disaster; as by fire. Science in our own day furnishes a basis for a more definite forecast. Sudden catastrophe is still by no means precluded, for astronomers have occasionally witnessed outbursts in other regions of the universe which may have produced profound changes throughout neighborhoods like our solar system and have brought to some tragic end life on planets like the earth.

With the development of the doctrine of energy has come the conviction of an end of the world; inevitable, as the death of the individual is inevitable. In neither case, however, is longevity to be regarded as necessarily beyond human control. Biologists are beginning to intimate, and it would seem with growing confidence, the possibility, remote but thinkable, of a considerable extension of the term of bodily life. Equally conceivable is it that the race, if it become sufficiently wise before old age overtakes it, may so modify and control the conditions of life as to greatly prolong its career.

We do not need to consider a conceivable end by cosmic catastrophe any more than

[1] Address of the retiring president of the American Association for the Advancement of Science, Baltimore, 1908.

the individual in estimating the number of years that he may reasonably hope to live would take into account death by lightning —were that the only death, he might look forward to a very long life. Neither need we consider the accuracy of the forecasts of the probable future of the sun any more than the individual takes into account probable geological and climatic changes as having any bearing on his own expectancy of life. The drama of human existence on the earth is a fleeting show when measured in terms of the duration of the sun. The exhaustion of our supply of fixed nitrogen, a contingency discussed some years ago by Sir William Crookes, and of our free oxygen which was more recently suggested by Lord Kelvin are factors that bring the question of the duration of human activity somewhat nearer home but they are still so remote as to be of no immediate practical importance. Other factors there are, however, that are not only immediate but rapidly becoming imminent and pressing.

At the recent conference on the conversation of resources which met at the White House at the invitation of the president of the United States notes of warning were sounded concerning the coming exhaustion of coal, wood, ores and soils. Whether or not we accept as exact the estimates furnished by experts on that impressive occasion, there is no doubt that we are approaching the end of our available resources and that the near future will have momentous problems to face.

Certain things are clear.

First. Unchecked wastefulness as exhibited, for example, in the extermination of the bison, in the destruction of forests, in the exhaustion of the soil, in the disappearance from our coasts and streams, that once teemed with fish, of this important source of food supply, in the pouring into the air of an incredible amount of unused fuel from hundreds of thousands of coke ovens must cease or our ruthless exploitation will bring disaster on generations soon to come. The prevention of these and countless other manifestations of individual and corporate greed is a problem for the economist and the law-maker although they will scarcely succeed in its solution without calling science to their aid.

Second. Saving and thrift offer at best only a postponement of the day of distress. The end of our supplies of coal and petroleum must ultimately be reached. Forests may be renewed and the soil restored to its maximum fertility but the problem which is presently to confront the race is that of civilized existence without recourse to energy stored by the slow processes of nature. This problem must be definitely solved before the complete exhaustion of our inherited capital.

Third. The problem is not without conceivable solution, since the annual accession of energy from the sun, did we know how to utilize it without awaiting the slow processes of storage employed by nature, is ample for every thinkable need of the future inhabitants of our planet. Estimates of the constant of solar radiation show that about 2.18 kilowatts of power is continually received from the sun for every square meter of the earth's surface or over seven and a half millions of horsepower per square mile. The present use of power in the United States is about eighty million horse-power or one horsepower per capita. This quantity is likely to increase more rapidly than the population in the future unless curtailed by lack of fuel, but it is evident that a very small fraction of the sun's radiation would meet all demands.

Now abundant power is soon to be the factor upon which material advancement will chiefly depend. To obtain it in the face of the disappearance of coal and petroleum will be imperative. For success in this, upon which in the immediate future the welfare of the race and ultimately its very perpetuity is to depend, we must look to science. Mere ingenuity or inventiveness, however widely developed, will not suffice. The inventor and the engineer can but utilize and apply the material which the man of science provides and with the exhaustion of our stores of scientific knowledge civilization must halt.

It is of this fundamental relation of science to the progress of our civilization that I wish to speak. The fact that material progress is based upon science seems to be but dimly understood. It appears to be generally supposed that it is to the inventor and to those who use his devices that we owe our present advantages over our forefathers. I would not belittle the achievements of the so-called practical man, but the public must be taught that application can never run ahead of the knowledge to be applied and that the only road to higher achievement in practical things is by the further development of pure science.

The *main product* of science, using that word in its broadest sense, is *knowledge;* among its by-products are the technological arts, including invention, engineering in all its branches and modern industry. Not all industries have attained the character of a technological art. Burning the woods to drive out game and thus obtain a dinner, is a form of industry. Like it in character are some very large industries, such as agriculture of the sort that impoverishes the soil; lumbering that destroys forests and incidentally ruins rivers and increases erosion; coke making by processes that waste forty per cent. of the energy of coal. The production of power from coal by means of the steam boiler and the reciprocating engine we at present regard as a highly developed technological art; yet it is a process which at the very best converts less than ten per cent. of the total stored energy of the fuel into available form. If the ultimate purpose of this power is the production of light, we by our present methods suffer a second waste of ninety per cent. or more, so that the efficiency of the combined processes is but a fraction of one per cent. These things are excusable while ignorance lasts. They become criminal with realization of the results and are inconceivable in a community of fully developed civilization. Science paves the way for the gradual supplanting of these barbarous methods by more refined and rational processes, but they often persist long after they are known to be injurious to the public welfare because they happen to serve some selfish individual or corporate purpose. In such cases it is to science again that we must look for the development of an enlightened public opinion that will end them.

Nearly all really important technical advances have their origin in communities where the great fundamental sciences are most extensively and successfully cultivated. In the field of artificial illumination, to take a concrete example, each successive improvement over the tallow-dips and whale-oil lamps of our ancestors has come to us from over the water.

The first building to be lighted by coal-gas was the chemical laboratory at Würtzburg (1789). Illuminating oils were being made from petroleum by Binney and Young, in England (1850), at a time when we were bottling our crude oil and selling it for liniment.

During the later years of the nineteenth century occurred the sudden development of arc-lighting in this country; a change from darkness to light unprecedented and almost unimaginable. This magical transformation from conditions but little removed from medieval darkness was largely due to the ingenuity of Farmer, Brush, Elihu Thomson, Weston and numerous other American inventors, backed by an energetic people keen to adopt whatever appeals to them. The electric arc, however, was discovered by Sir Humphry Davy (1806). It was the development of the voltaic battery by Grove and Bunsen (1840) that gave the first impetus to electric lighting, and of the dynamo by Gramme and Siemens that made it a commercial possibility. Arc lamps had been in regular use in the lighthouses of England and France since 1858; a factory in Paris was thus illuminated in 1873; widespread public interest in arc-lighting was first kindled by the dazzling display at the Paris exposition of 1878.

Lighting by glow-lamps, like arc-lighting, had its first great growth in America. Nine years after Edison's announcement of his plan of installing high-resistance lamps in multiple in a constant potential circuit, and his public demonstrations at Menlo Park of the practicability of the scheme, over three million such lamps were in use in the United States.[2] The incandescent lamp, however, with the essential feature of a carbon filament in vacuo, seems to have originated, although not yet in practicable form, with Swan in England some years previous to 1879.[3]

To Auer von Welsbach, Nernst and Bremer, in Germany, we owe the use of the oxides of the rare earths as illuminants; to Arons, of Berlin, the mercury arc in its original form; to various inventors and experimenters across the water the new filaments of tantalum, tungsten and other refractory metals that are rapidly replacing our filaments of carbon. The Pintsch gas which lights our railroad trains is likewise a German invention.

[2] T. C. Martin, *Electrical World*, Vol. IX., p. 50.

[3] Dredge, "Electric Illumination."

In the matter of acetylene, although priority for its commercial production was awarded to Wilson in Canada, the process historically considered is obviously traceable to the scientific researches with the electric furnace at the hands of Moissan in France. The absorption of acetylene by acetone, which makes storage in portable form of that brilliant illuminant practicable, is likewise a European idea.

This summary of facts does not display an exceptional, but a prevalent, condition. It might be duplicated in almost any department of technology. Although we in this country have had a hand in the development of the art of generating power nearly every important step in the use of steam originated in Europe, as did most of the devices pertaining to boilers and engines; such as gauges, injectors, governors, condensers and the like. This is not strange, in the case of the reciprocating engine, which is an old-fashioned machine, a relic, the continued use of which is due chiefly to the extraordinary tendency of the race to cling to the things of the past. It is true, however, to no less extent of the invention of internal combustion engines, steam turbines, water turbines and of the whole family of electrical devices for the transmission of power. Generator and motor, transformer and storage battery alike had their inception overseas. It is the same in artificial refrigeration, in telegraphy, in photography; indeed, in nearly all the arts that are based upon the fundamental science of physics. In the great fields of industrial chemistry, especially, European preeminence is universally admitted.

All this does not mean that we do not deserve our popular reputation as an ingenious people, facile and versatile, quick to grasp and put to use any novelty. Nowhere else in the world has cunningly devised and admirably designed machinery been made to supplement and supplant hand labor so successfully; we have indeed a passion and a genius for invention. But it is one thing to contrive clever mechanical combinations based upon simple principles long since established and familiar in every machine shop and quite another to possess the combination of profound chemical knowledge and technical skill that have yielded such extraordinary results in the glass works at Jena, or the mathematical ability to develop the theory of lenses to the point which has made it possible to design the wonderful optical instruments that have made the same little German town famous.

Many inventions that did not originate with us have found their widest field in this country. Many foreign ideas have first obtained practical form for general purposes here. We were among the first and continue to be by far the most extensive users of the electric railway. In Davenport, Page, Farmer, Green and others we count pioneers of the predynamic period worthy to be named with Davidson, Pinkus, Jacoby, Bessolo and other European inventors of their day. Nevertheless it was Pacinotti, Gramme and Siemens who gave us the electric motor; it was at Sermaize in France that the classical experiment of plowing by electricity was performed; it was at the industrial exhibition in Berlin, in 1879, that the first electric road in the modern sense was operated. The first roads for ordinary everyday public service were the Berlin-Lichterfelde Line and the Port Rush Electric Railway, in Ireland, a third-rail system supplied with water-power. Budapest had the first successful underground trolley road. The most advanced type of electric traction by the use of alternating currents, as exemplified in Switzerland, northern Italy and elsewhere has only very recently received serious attention in this country.

We transmit a larger amount of energy over greater distances and at higher voltages than any other people, but the practical possibility of such transmission was first exemplified by the sending of power from the waterfalls at Laufen 100 kilometers away, to the electrical exhibition at Frankfort-on-Main, in 1892.

It is not a question of American *versus* European skill, but of the conditions under which useful applications are likely to originate. The history of technology shows the essential condition to be scientific productiveness.

A country that has many investigators will have many inventors also. A scientific atmosphere dense enough to permeate the masses brings proper suggestions to many practically inclined minds. Where science is there will its by-product, technology, be also. Communities having the most thorough fundamental knowledge of pure science will show the greatest output of really practical inventions. Peoples who get their knowledge at second-hand must be content to follow. Where sound scientific conceptions are the common property of a nation the wasteful efforts of the half-informed will be least prevalent. The search after perpetual motion, the attempt to evade the second law of thermodynamics and the promotion of the impracticable are all simply symptoms of a people's ignorance.

Modern invention is a very near neighbor to the pure science of the laboratory and the relation becomes daily more intimate. Nothing could apparently be more academic in its early development or further from the practical workaday world than the subject of electric waves. For years it was regarded as a fine field for the speculations of the mathematical physicist. Then at the hands of Hertz and his followers it became a fascinating topic for experimental investigation by men devoted to science for its own sake. Suddenly it was launched into the realm of hard-headed commercialism by a practical man, daring, enthusiastic and optimistic enough, at a time when electric waves could be produced in one room of the laboratory and detected in the next room, to dream of sending such waves across the sea as bearers of human messages.

At every step of its development the things that have made wireless telegraphy possible have been borrowed from pure science.

While Marconi was still struggling to adapt the apparatus of Righi to long-distance transmission the antenna and the coherer were already in use by Popoff[4] in the study of oscillatory lightning. In the thermal detector of Fessenden the almost invisible platinum wires produced years before by Wollaston for the cross-hairs of telescopes appear in a new field of usefulness. The "lead-tree" familiar as a simple and beautiful lecture experiment in electrolysis forms the basis of the responder of DeForest. Another form of electrolytic detector introduced independently as the receiver of wireless signals by Schloemilch and by Vreeland traces back to the Wehnelt interrupter. Marconi's latest receiver, the magnetic detector, is an ingenious modification of Rutherford's device for the study of electric waves and this in turn was based on the classical experiment of Joseph Henry on the effects of the discharge of Leyden jars on the magnetization of steel sewing needles.

It is needless to multiply examples. In the history of science and of invention this intimate relation appears to be almost universal.

In this country science is making a great growth, particularly in material equipment. The number and size of our special societies is increasing year by year. The American Association for the Advancement of Science has already a membership of more than 6,000. Our scientific journals are steadily growing in influence and importance. Colleges everywhere are building laboratories and the universities are increasing their facilities for research. The federal and state governments are beginning to recognize the necessity for scientific investigation and to foster it.

Nevertheless there is much to be done to bring us up to the European standard. Our position is like that which exists in agriculture. The total product of wheat and corn is enormous, but when we consider bushels per acre we realize the superiority of the intensive cultivation of older countries. In science likewise our total output is creditable, but our specific productiveness is still low. The discrepancy can hardly be ascribed to inferiority of intellect or to lack of industry, for we are of the same stock as those who have created modern science and who have given it its high place in other countries. For an explanation we must look, rather, to environment and to the conditions under which scientific work is done here and abroad.

Now the environment of science has always been academic. Science has its home in the university. From Galileo and Newton to our own time the men who have laid the foundations upon which civilization is built have nearly all been teachers and professors.

A few notable exceptions there are, such as Darwin, whose centenary we are about to celebrate. Each branch has its short list of unattached investigators—Franklin, Rumford, Carnot, Joule in physics, etc., but the honor-roll of science is essentially an academic list.

[4] Popoff, *Journal of the Russian Physical Chemical Society*, Vols. 28 and 29, 1895.

It is so in America as elsewhere, but abroad the dictum of the university is authoritative; with us the term *academic* is one of contempt. European practise is confidently based on theory, but in America men of affairs habitually use the word *theoretical* as synonymous with impracticable, unworkable and not in accordance with fact.

It is necessary, therefore, in considering the place of America in science, to contrast the standing of our educational institutions, not pedagogically, but as centers of research, with those of our neighbors. I attempt no general comparison but offer only a single simple illustration drawn from the one branch of science for which I feel competent to speak: Holland has but four universities, with less than four thousand students in all. There are in this country at least fifty institutions larger and better equipped on the average than the Dutch universities. If we were on a par with Holland in physics, for example, we should have seventy or more university teachers, who were, at the same time, investigators of the rank of Lorentz, Zeeman, Julius, Ohnes, Haga and Van der Waals. I shall not venture into other sciences, but leave my colleagues to make their own comparisons.

We have less than our share of men of science because we have not, as yet, universities that sufficiently foster and encourage research. When in any of our institutions a man distinguishes himself by productive work he is frequently made a dean, director or even president, and is thus retired from what might have been a great career as an investigator. Thereafter he is compelled to devote himself to administrative duties, which some one not equipped for the important task of adding to the world's stock of knowledge might just as well perform. It is as though the authorities were to say: *X* has written an admirable book; we must appoint him bookkeeper—or *Y* is developing a decided genius for landscape; we will increase his salary and ask him to devote all his time to painting the woodwork of the university buildings. Nor does the mischief stop with the sacrifice of a few bright spirits. It extends to the bottom. The head of each department is a petty dean, cumbered with administrative detail. He is expected to hold every one under him to account, not for scholarly productiveness, but for the things which chiefly hinder it.

In this exaltation of administrative ability over creative gifts which are much rarer and more precious, our institutions share the weakness which pervades our industrial establishments where the manager or superintendent usually gets larger pay and is regarded as more important than the most expert craftsman. In both we see the same striving for a certain sort of efficiency and economy of operation and for the attainment of a completely standardized product. This tends in both cases to the elimination of individuality and to sterility. In the university it retards instead of developing research. In industry it discourages originality. I would that there might be displayed in the administrative offices of every institution of higher education this testy remark once made by an eminent scholar: *"You can not run a university as you would a saw-mill!"*

If any one questions the responsibility of the American university for the shortcomings of American science and is inclined to seek some more obscure cause for the conditions that I have endeavored to portray, let him consider the history of astronomy in this country. This science for some reason was from the first accorded favors not vouchsafed to any other branch of learning. Colleges that made no pretence of research and had neither laboratories nor libraries worthy of the name were ambitious to have observatories, and rich men were found to establish and endow them. The observatory implied, somehow, to the minds of the authorities, an astronomer—not merely some one of good moral character who could teach the subject—and so it came about that there was one member of the college faculty who was expected to do scientific work and was left comparatively free to observe and investigate. Modest as most of these early provisions for astronomy were, they bore fruit, and American astronomy gained standing and recognition while her sister sciences were struggling for existence. Later, it is true, there arose an ambition for laboratories and there were laboratories; but unfortunately, save in very rare instances, the laboratory has not implied an investigator. The conditions which made astronomy what it was have not been repeated. Productiveness has not been demanded nor expected; neither have the inmates of our laboratories been accorded that exemption from excessive pedagogical duties which would enable them to give their best strength to research. Were it otherwise I should not now be reminding you sadly of these deplorable *home-conditions* of our sciences, but singing their achievements.

A recent event in the educational world well illustrates the weakness of our academic attitude toward science. The head of one of our strongest, most modern, most progressive and best equipped institutions has announced, as one of the details of a noble bequest to the university, the endowment of ten research professorships.[5]

President Van Hise declares:

> The provisions for their support, including liberal salaries, assistants, materials, a limited amount of instructional work, and relations with students, are an epitome of the situation in the best German universities, which are admitted to stand first among the institutions of the world in the advancement of knowledge.

This is indeed an event to warm the heart of every one who is interested in the promotion of science. All who are devoted to learning for its own sake or who realize the importance of science to the welfare of the nation will applaud that portion of the will in which this great gift is made, which reads:

> The university may best be raised to the highest excellence as a seat of learning and education by abundant support in pushing the confines of knowledge.

And yet in very truth there is nothing to prevent the University of Wisconsin, or any other of a hundred of our institutions, without awaiting the rare advent of some far-sighted benefactor, from having, not ten, but all her professorships made research professorships—nothing, alas, but the deep-seated and seemingly uneradicable conviction of our boards of control, that the endowments committed to their charge are for some other purpose.

A true university from the standpoint of scientific productiveness is a body of scholars; that is to say, of men devoting themselves solely to the advancement of learning. Every one in it from top to bottom should be an investigator. The entire income of a university should be expended in the promotion of science, *i. e.*, of knowledge. Teaching is a necessary factor in the advancement of learning and so a function of the university. University teaching should be done by investigators not only because more investigators are to be developed, but because the promotion of science, on the scale which the future demands, means that science shall not remain narrowly academic, but shall more and more pervade the life of the people.

From the standpoint of American institutions such a definition of the university

[5] "Memorial Exercises in Honor of William F. Vilas," SCIENCE, XXVIII., October 30, 1908, p. 601.

is revolutionary, but it can not be said to be impracticable or Utopian; for upon precisely such ideals the most successful university systems in the world have been built.

That this type will bear transplanting to American soil was triumphantly demonstrated in the work of Daniel C. Gilman, who gave the Johns Hopkins University at its inception the essential characteristics of the German universities as regards research. This successful experiment should have marked an epoch in the history of higher education, but a generation has passed and we have not as yet a university system devoted primarily to the advancement of learning. We still consider investigation merely as a desirable adjunct to university activities: never as the thing for which the university exists.

Germany, on the other hand, has for a century consistently developed the university as a center of research and through the promotion of pure science in the university has made German civilization what it is to-day.

I would not be understood as urging German or other European methods in all details upon a country where quite different conditions exist but one general principle is of universal application. In whatever we have to do, whether it be municipal administration, sanitation, road-making, the construction of water-ways, the development of industries, or the conservation of natural resources, the fullest and latest scientific knowledge should be utilized. Practise should not be permitted to lag indefinitely behind theory and that they may go hand in hand public work and private enterprises should be in the hands of *those who know*. At the same time science should be persistently advanced by every possible agency.

As American men of science we should demand for America also universities whose purpose is the production of knowledge. There are those who will reply to such a demand that we need not look abroad; that we are already developing an educational system better for our purposes than any that has hitherto existed. So be it, but whatever pedagogical experiments we may choose to try, science and the advancement of learning must not be forever sacrificed to them. *We need not merely research in the universities but universities for research.*

To my mind the future of science in America as elsewhere is essentially a question of the future of the universities. It is conceivable that our institutions may so long continue blind to their chief function as to be supplanted by some new agency called into existence to take up their neglected work. Already great endowments for the promotion of research quite without any pedagogical feature, have come into existence. For all such science has need and will have increasing need as our situation becomes more acute and we are brought closer to the great crisis.

But it will be found that the conditions for maximum scientific productiveness are precisely those which would exist in the ideal university. All attempts at a machine-made science are doomed to failure. Science-making syndicates are likely to meet ship-wreck on the very rocks on which our American educational system is already aground. No autocratic organization is favorable to the development of the scientific spirit. No institution after the commercial models of to-day is likely to be generously fertile. You can contract for a bridge, according to specifications. If a railway is to be built and operated a highly organized staff with superintendents and foremen and an elaborate system reaching every detail may be made to yield the desired results. No one, however, can draw up specifications for a scientific discovery. No one can contract to deliver it on a specified day for a specified price. No employee can be hired to produce it in return for wages received.

To the investigator the considerations I have endeavored to present are unimportant. Science for its own sake is his sufficient incentive; but it is all important for the community at large to realize that no real addition to knowledge is useless or trivial; that progress depends on scientific productiveness; that science, which must be fostered if we are to continue to prosper, is a republic whose watchwords are *liberty, equality, fraternity.*

World power in the near future is to be a question of knowledge—not of battleships—and what is now spent on armaments is to be devoted to its pursuit.

Beyond lies that future in which it will no longer be a question of supremacy among nations but of whether the race is to maintain its foothold on the earth. For that great struggle we shall need knowledge, and ever more knowledge, and it is high time that we should prepare for war in these days of peace and plenty.

Edward L. Nichols

Cornell University,
December 14, 1908

UNIVERSITY REGISTRATION STATISTICS II.

Taking up the registration at the universities in order, we find that the *University of California* shows an increase of 75 in the graduate school, of 96 in the undergraduate body in arts, science and engineering, and of 77 in the professional schools. In arts there are 79 more men and 43 fewer women, a net gain of 36. The enrollment in the summer session exhibits an increase of 228 over 1907. The 95 students registered in law are enrolled in the Hastings College of the Law in San Francisco. Besides these there are 24 seniors and 17 graduate students in jurisprudence at Berkeley, of whom a considerable number are candidates for the degree of *juris doctor,* these 41 students thus in reality constituting a graduate school of law. Of the extension students about 750 are enrolled in San Francisco, about 150 in Stockton, and about 250 in Sonora, and there are other centers in process of organization. Mr. James Sutton, recorder of the faculties, reports as follows:

Professor Eugene W. Hilgard, who was called to the University of California as professor of agriculture in 1874, has retired from the active work of the department, and Professor Edward J. Wickson becomes professor of agriculture and director of the agricultural experiment stations. Professor Frank Soulé, who became a member of the faculty in 1869, has been appointed professor of civil engineering, emeritus, and has been succeeded as the head of the department of civil engineering by Professor Charles Derleth, Jr., formerly associate professor of structural engineering. The regents have established a professorship of psychology, and have appointed thereto Professor George M. Stratton, who since 1904 has been professor of experimental psychology at Johns Hopkins. Another chair established during the year was that of professor of agricultural practise and superintendent of farm schools. The first appointee is Leroy Anderson, formerly of Cornell University. To the chair of Romanic languages, which has been vacant for several years, the regents have appointed Professor William Albert Nitze, until recently professor of Romance languages in Amherst College. The department of Semitic languages suffered grievous loss in the death, on April 27, 1908, of its founder and head, Dr. Jacob Voorsanger. Assistant Professor William Popper is in charge of the work of the department.

Plans have been prepared for the Boalt Memorial Hall of Law. Mrs. Boalt's original gift was $100,000, but members of the California bar have pledged an additional $50,000 to complete the building. In addition, there is available a considerable fund for a law library. Construction work upon the new Doe library is well advanced. Present plans contemplate the completion immediately of the northern part of the building, which will amply allow for library needs for several years to come. The amount available at the