Publications Committee

[149]

The University of Texas Record

Vol. II
Number 2
June
MDCCCC

Published by the
University of Texas
Austin, Texas

The University Record.

The University Record is published quarterly; subscription, one dollar a year; single copies, twenty-five cents. Advertisements, one page, $15; half page, $10; quarter page, $7½, with 25 per cent. discount on contracts for a year.

Address business communications to

John A. Lomax,
Business Manager,
Austin, Texas.

[Entered as second-class mail matter at Austin, Texas.]

THE UNIVERSITY RECORD.

VOL. II.—JUNE, 1900.—NO. 2.

CONTENTS.

THE UNIVERSITY RECORD.

VOL. II.—JUNE, 1900.—NO. 2.

THE RELATION OF CHEMISTRY TO CIVILIZATION.

H. W. HARPER.

The facts of chemistry are built upon the fundamental constants: matter and motion, and, therefore, would seem to be coexistent and coextensive with time and space—that the universe, from the ethereal through the structural to the ethereal again, is merely an eternal period of chemical activities. Rigid analysis, however, will not sustain the "seem to be," for not only is empty space conceivable, but chemical phenomena themselves are severely restricted by comparatively narrow limitations, and chemistry may be accurately defined as the science of interatomic (intramolecular) phenomena which occur between the real zero absolute and a temperature sufficiently high to convert all matter to the atomic state. In this definition *chemical unit,* i. e., "a center through which energy manifests itself," is the idea desired to be conveyed by the word atom and its derivatives as used here—in which sense it is in conflict with neither the atomisticists nor the mathematico-physico-phenomenologists. Modern philosophy would probably insist upon the entire extrusion of the word "matter." To meet this exigency it is merely necessary to adjust Mach's definition of physics so that it will read: chemical "experience arranged in economical order,"—"that the aim of research is the discovery of the equations which subsist between the elements of phenomena." It matters little which definition is accepted—they both have the same aim, and for all practical purposes their meaning is identical. Postulating the existence of matter, then the simplest equation which subsists between the elements

of chemical phenomena finds its expression in: The properties (phenomena) of matter are periodic functions of the atomic and molecular masses which constitute it and the rates of motion of these masses.[1]

With limitations no wider than here indicated it can easily be shown that the entire experience of man is closely identified with chemical phenomena. That while the existence of chemical phenomena long antedated the coming of organized living forms, and will continue to exist when all that now constitutes the modern idea of life has passed away, the science of chemistry is but a child of the era man—conceived in the mind of the savage who first interrogated himself concerning the changes in matter, and born of him who first in experimental evidence sought an explanation of these changes.

Thus it will be seen that chemistry is a fundamental science. That it possesses a broad and deep foundation and a superstructure ever widening and differentiating as the progress of human knowledge extends. In reality it underlies all the other natural sciences, is a helpmeet to them all, and has contributed in no small way to the mental development, comfort and welfare of man and the progress of civilization.

From the early days of darkest Alchemy to the dazzling light of 1900 is a long and interesting story. Too long to dwell upon here, too interesting to cast aside. Even the high-lights would fill a volume, and the task of elimination is Herculean.

Turning from the evidence of nature's record, which had its beginning in the "twilight of time," to the evidence recorded by man, chemistry is there shown to be the child of Alchemy. Even here its ancient origin is apparent, as is plainly to be seen in Olaus Borrichius's professed extract from the writings of Zozimus, quoted as follows:

"The writer first refers to a fact which he had managed to deduce from the scriptures, Hermes Trismegistus, and many other sources —namely, that there is a tribe of genii possessed of an unhappy propensity to fall in love with women. The ancient and divine scriptures inform us that the angels, captivated by women, taught them

---

[1]Transmutation of Matter, Harper, Texas Academy of Science, Vol. II, No. 2, page 84.

all the operations of nature. Offence being taken at this, they remained out of heaven because they had taught mankind all manner of evil, and things which could not be advantageous to their souls. The scriptures inform us that the giants sprang from these embraces. Chema is the first of the traditions respecting these arts. The book itself is called Chema; hence, the art is called Chemia." It appears to have been a favorite opinion among Arabian alchemists, and shared by Albertus Magnus, that Hermes Trismegistus was the father of their science. "That august personage is represented as having flourished two thousand years before the appearance of Christ." Borrichius himself seems to believe that the Hermetic art descended from Tubal-Cain or Vulcan.

The Holy Bible also bears testimony to the early origin of the "sacred and divine art of making gold and silver;" for in Genesis 2, reference to *gold* and *good gold* will be found in verses 11 and 12. Again, in Genesis 40, verse 42 reads: "And Pharaoh took his ring from his hand, and put it upon Joseph's hand, and arrayed him in vestures of fine linen, and put a *gold* chain about his neck." Exodus 20, verse 23, reads: "Ye shall not make with me gods of *silver,* neither shall ye make unto you gods of *gold;*" chapter 25, verse 11: "And thou shalt overlay it with *pure gold,* within and without shalt thou overlay it, and shalt make upon it a crown of *gold* round about." The entire chapter abounds with evidence of the ability of men to work with, and in, such metals as gold, silver, brass, copper, tin and lead. It is needless to say that alchemy was practiced at this early date; it is likewise needless to further recount, in support of this claim, the additional evidence scattered throughout the Bible.

The fact is clear, that the science and art of chemistry has ever been the helpmeet of man. The latest and most brilliant output of the 19th century is only a distant but continuous reflection of the same spirit that dominated and sustained the alchemist while toiling with his crucibles and alembics in the arduous search for *"the secret of transmuting the baser metals into gold and silver,* and *the means of indefinitely prolonging human life."* That he failed to attain the object of his search matters little—the fact remains that he *worked,* and the civilization of today is his debtor. Few realize the largeness of the debt to alchemy. Throwing out the consideration of the immense stores of information accumulated by

the workers in the Black Art, and side-tracking their contributions to philosophical lore;—in fine, dispensing with all save one fact, concentering upon which the world today, so far as this one debt is concerned, remains insolvent, there stands in boldest relief, THE LABORATORY METHOD OF INVESTIGATION—a monumental and immortal contribution that might well have come from the gods. Thus it is shown that this most formidable contribution of chemistry to educational methods is of very early origin; that its influence upon the welfare of man has been marked in all ages.

To enumerate the progress of even a single century is not within the scope of this article; but a rapid glance over the history of man must make it patent to any one how intimately connected with the development of civilization the science and art of chemistry really is.

From the first kindling of fire, cooking of food, and burning of pottery to the founding of implements of bronze and of iron, and the manufacture and use of glass, pigments and embalming fluids, covers an early and long period in the development of civilization. Although this period long antedates the days of Thales, the part played therein by alchemic art is conspicuous. Again, from the time of Thales to the time of Marcus Graecus (compiler of the "Liber Ignium") and Geber, who is usually looked upon as the founder of chemistry, a period covering 1500 years (640 B. C., to 860, A. D.), the important contributions of chemic art are numerous, as is well attested by the discovery and use of gun-powder, Greek-fire, nitric and sulphuric acids, aqua regia, caustic soda, corrosive sublimate, mercuric oxide, silver nitrate, several other chemicals and medicaments, and many important chemical processes, such as distillation, sublimation, filtration, crystallization, cupellation, etc.

The blighting influence of the Socratic philosophy upon experimental science appears to have greatly retarded the growth of chemistry from the passing of Geber until the close of the 14th century. During this remarkable period of intellectual sterility nearly all of the real progress made may be summed up in the work of Avicenna, Avenzoar, Averrhoes, Albertus Magnus, Thomas Aquinas, Roger Bacon, Arnold Villanovanus, and Raymond Lulli; and the greatest of these are Albertus Magnus, Thomas Aquinas, and Roger Bacon. With the exception of the discovery of ammonia and alcohol, and the

introduction of gunpowder to the Western nations, the growth of chemistry during this period mainly consisted of the more refined and extended application of the knowledge possessed by Geber.

Inasmuch as the cob-webs of scholasticism mostly consisted of hair-splitting and ambiguous arguments over second-hand knowledge, it is hardly to be expected that an observational science could make much progress during the 15th and 16th centuries; and so, the advance of chemistry during this period is mainly (almost solely) due to the efforts of a few eminent physicians. The list of experimenters belonging to this era whose work is well known includes: Basil Valentine, Paracelsus (Phillippus Aureolus Theophrastus Paracelsus Bombastus von Hohenheim), Agricola and Libavius.

The environment of the 17th century imparted great impetus to the growth of chemistry; many noble workers were enlisted in its cause, and their labors have intellectually and materially enriched the world. Van Helmont, Sennert, Glauber, Sylvius, Robert Boyle, John Mayow, Hooke, Hales, Kunckle, Becher, Homberg, Lemery, Stahl, Friedrich Hoffman, and many other men of splendid ability contributed to this period of activity. To enumerate their contributions is beyond the space allotment for this article; but it should be remembered that the *Royal Society* and the *Académie des Sciences* came into existence during the 17th century; and in their archives are recorded many remarkable discoveries, none of which are more important than the contributions to aerial chemistry.

The 18th century not only inherited the knowledge and stimulus of the workers of the preceding century, but witnessed the building of the solid foundation upon which rests the great structure of modern chemistry, and it might well be added, modern science. Stahl's enthusiastic espousal of Becher's phlogiston theory practically dominated the chemical thought of the beginning and middle of the century, and under that influence qualitative chemistry made important strides. Among the phlogistics will be found such men as Black, Cavendish and Priestley, in England; Marggraf, Neumann, Eller, and Pott, in Germany; Geoffroy, Macquer, Helot, and Duhamel, in France; and Bergman and Scheele, in Sweden. Boerhaave seems to have taken very little interest in the theory, but devoted his life to experimental study. He may be looked upon as the founder of organic chemistry. The important discoveries of the century are, indeed, numerous; the more memorable ones are: car-

bon dioxide by Black; nitrogen by Rutherford; *oxygen* by Priestley; and also by Scheele; hydrogen and the composition of water by Cavendish; chlorine by Scheele;—and most of all: the *indestructibility of matter* by Lavoisier. The application of the balance to the study of chemical reactions revolutionized the study of chemistry and sounded the death knell of the phlogiston theory. Quantitative chemistry became a fact; and this important discovery soon led Lavoisier to the "Law of conservation of matter, and chemical combination in definite proportions by weight"—a law that is to this day the corner-stone of modern science. Without it "conservation of energy" and the modern theory of evolution are not intelligible, and in all probability would never have been known. The epoch making character of Lavoisier's work justly entitles him to be called the father of modern chemistry. He explained the relation of plants and animals to the atmosphere, the phenomena of combustion, heat and matter, organic substances; announced a definition of the "element" that is in accord with the definition of today; developed a new nomenclature and the new chemistry as enunciated in the following dicta:

1. "In all chemical reactions, only the form of the materials changed, the quantity remained the same. The substances used and the products gotten can be brought into an algebraic equation, by means of which any one unknown member may be calculated.

2. "In all combustions the burning body unites with oxygen; and in general an acid is formed by combustions of a non-metal, and, by combustion of the metals, a metallic calx or oxide is formed.

3. "All acids contain oxygen united with a base or a radical which, in the case of inorganic bodies, is generally an element; in organic, it is made up of carbon and hydrogen, and often contains nitrogen and phosphorus, as well as other elements." (Venable—from *Oeuvres de Lavoisier.*)

Far reaching were these conclusions. While not in entire conformity with the ideas of today they have had a marked influence upon the progress of chemistry throughout this century, and that influence will continue to be felt for centuries to come. Unfortunately for the world Lavoisier was not only a great savant but also a *fermier-général,* and because of his efficiency in this latter capacity the followers of Robespierre, despite the protests of the most learned men of France, gratified their insatiable insane desire for blood by

sending to the guillotine in 1794 "one of the clearest intellects and most comprehensive minds that science has known." But the din of the *Ca ira* and *La Carmagnole* did not silence the influence of this giant intellect. Lavoisier was dead; but the new chemistry he had created was full of life and vigor, and spread as a mighty force throughout France, Germany and England. The 18th century passed away, but it gave birth to the 19th—and the glorious achievements that conspicuously mark this as the electric era are in large measure the outgrowth of the inherited impress of the work of Lavoisier.

To discuss the achievements of the 19th century is an encyclopedic undertaking. Even to mention the men whose names are landmarks in the century's progress of chemistry is beyond the scope of this paper; yet, to incorporate the more memorable deeds of a very few of a long list of brilliant contributors seems to be an imperative necessity. But the path of abridgment is difficult to follow. It is beset at every turn with luring guide-posts, and the danger of running far afield appears insurmountable. In taking the shortest path much of the most imposing scenery must necessarily be missed, and so the perspective becomes narrowed and distorted, and falls wide of the mark. It is, indeed, difficult to pass without comment the brilliant and important work of such men as Dalton, Berthollet, Proust, Gay-Lussac, Richter, Davy, Avogadro, Ampére, Wollaston, Klaproth, Berzelius, Thénard, Dumas, Humbolt, Mitscherlich, Rose, von Liebig, Wöhler, Dulong and Petit, Chevreul, Kopp, Stas, Hofmann, Gmelin, Laurent, Gerhardt, Graham, Frankland, Kolbe, Wurtz, Williamson, Odling, Kekulé, Kirchhoff and Bunsen, Regnault, Boussingault, Bernard, Marignac, Cannizzaro, Pasteur, Fresenius, Mendeléeff, Lothar and Victor Meyer, Van't Hoff, LeBel, Berthelot, Hoppe-Seyler, von Baeyer, Crookes, Fischer, Ostwald, Olesewski, Moissan, Ramsay, Raoult, Dewar, Koch, Roux, and many other illustrious workers whose contributions form an integral part of the warp and woof of 19th century chemistry. A sincere consideration, however, for the overburdened reader constrains the author from attempting to present here more than the merest fragment of the massive development of this era; and in presenting that fragment it is distinctly claimed that many other "fragments" equally important might have been chosen.

The knowledge of the air we breathe, the water and liquids we

drink, the food we eat, the clothing we wear, the materials with which our houses are built and beautified, the modern methods of heating, lighting and transportation, the instruments of music and of the painters' and printers' arts, and all the materials that enter into modern life are largely chemical contributions to civilization. Thought itself is the result of chemical action. It is probably little more than the breaking down of a complex phosphorus ion—or rather the ionic energy discharged as the phosphorus passes into a simpler molecular state.

Some one remarked that the prosperity of a nation is measured by the price of pig-iron; and some one else added that the progress of civilization is circumscribed by the production of pig-iron. Another stated that the world's three greatest civilizers are the steam locomotive, the electric telegraph and the Krupp cannon. Still another said that civilization was dominated by the mineral products of the earth—the metals and the non-metals—that the pig-iron, locomotive, telegraph, and Krupp steel would all come under this last head, and at their best would not make a very heavy draft upon the total supply. The meaning of this is not difficult to discern. It is merely the sordid measurement of dollars and cents stimulated by the mineral output of the United States for the year 1898, the value of which aggregated the sum of $697,820,720. Is it necessary to state that the utilization of this mineral wealth is a contribution of chemistry to civilization?

"Few people, who have not actually run a blast furnace, realize what it means to fill the capacious maw of one of those monsters with raw material. A stack of 200-tons daily capacity, running on 50 per cent. ore, must have delivered to it each day something more than 400 tons of ore, 250 to 300 tons of coke, according to the character of metal required, and over 100 tons of limestone, besides sand, coal, and minor supplies—say 900 tons raw material. Add 200 tons of pig-iron product shipped out, and we have a daily freight movement of 1,100 tons, taking no note of the disposition of the slag. This is 55 carloads of 20 tons each." (Quoted from "The American Iron Industry," by Archer Brown, in the *Engineering Magazine,* Vol. 18, page 88). The construction, during 1899, of a stack of 600-tons daily capacity, utilizing 3,300 tons daily of raw materials, involving the freight movement of 165 carloads, together with the fact that the output of this stack represents only 1-60 (one-

sixtieth) of the total output of pig-iron during the year 1899 in the United States alone, which involved the utilization of more than 72,270,000 tons of raw materials—a freight movement of more than 3,613,500 carloads—is only a small part of one year's contribution of chemistry to the civilization of the United States.

Space forbids further consideration of the great chemical industries; but some one says, that the world's greatest civilizer is printers' ink. If that be true, be it remembered that printers' ink, the type with which it is used, the paper upon which it is impressed, and the materials of which the impression press is made are, one and all, chemical products.

Owen Meredith wrote:

> "We may live without poetry, music, and art;
> We may live without conscience, and live without heart;
> We may live without friends; we may live without books;
> But civilized man cannot live without cooks."

It is patent to all that every cook is an empiric chemist; and the art of cooking is a chemical art.

The enormously increased annual demand for foodstuffs, incident to the nominal increase of the world's population, has caused many philosophers and economists to view with alarm the rapid approach of the universal famine that must inevitably come with the earth's declining fertility. But the chemist views such alarm with serene complacency. He is sustained by the fact that Justus von Liebig unlocked the secret of nature's storehouse of foods; that the genius of Liebig is an imperishable heritage, and that chemistry will provide man with adequate sustenance as long as the oxygen ratio of the earth's atmosphere will permit the existence of animal life on this planet.

The dynamical theory of heat having dissipated the belief in an early milennium of flame, many pessimists are now looking forward with gleeful pleasure to the fulfillment of their prophecies in the return of the bubonic plague. They merrily point to the horrors of the "Black Death" which swept over the civilized world during the 14th century, holding up as sustaining evidence the millions of lives that perished at its hands—that many nations nearly suffered extinction; that the scourge of that date was only a warning of the far more disastrous experience that must subsequently come

upon us. But the chemist replies, that on December 27, 1822, Louis Pasteur was born; and all humanity and animal life that is yet to inhabit this planet will be living immortelles of the monumental work of his precious life. The chemical work of Pasteur, Koch, and their followers, have not only shorn the "Great Black Plague" and the "Great White Plague" of their power, but have given to man domination over the desolating influence of all infectious diseases upon plants, man and other animals.

At the opening of the Pasteur Institute the great *Mâitre* said:

"Two adverse laws seem to me now in contest. One a law of blood and death, opening out each day new modes of destruction, forces nations to be always ready for the battle-field. The other a law of peace, of work, of safety, whose only study is to deliver man from the calamities which beset him.

"The one seeks only violent conquests. The other only the relief of humanity. The one places a single life above all victories. The other sacrifices the lives of hundreds of thousands to the ambition of a single individual. The law of which we are the instruments, strives even through the carnage to cure the bloody wounds caused by the law of this war. Treatment by our antiseptic methods may preserve thousands of soldiers.

"Which of these two laws will prevail over the other? God only knows. But of this we may be sure, that science in obeying this law of humanity will always labor to enlarge the frontiers of life."

Vale Pasteur. Throughout the civilized world today all living things, and things that shall live in the days to come, are blessed by thee. And thy life sung in every tongue to every nation shall immortally portray the relation of chemistry to civilization.

THE STUDY OF PHYSICS.

W. T. MATHER.

At the close of any epoch in the life of an individual or nation the mind naturally turns from the demands of the present to the deeds of the past, seeking in the panorama of events a knowledge of the causes that have led to the success or failure secured. This

inherited tendency, which is often stifled by an enforced concentration upon the exigencies of the present, is but an indication of the necessity for an understanding of the factors in human progress if we are to measure and meet the new conditions which daily confront us. So, at the close of a century characterized by an unprecedented industrial development we seek the formative influences which have molded the thought and work of the world in so vast a utilization of natural resources that in its entirety it is beyond our power to fully comprehend.

While, indeed, it is impossible in a brief survey of so complicated a problem to secure an adequate idea of the many interacting causes which have thus resulted, it is evident to the most casual observer that chief among them has been and is the ever increasing knowledge of natural phenomena and the conditioning relations between them which we term laws of nature. So manifest is this that argument is unnecessary. The proofs surround us on every hand in the countless agencies which, invading every phase of life and thought, have wrought out a new civilization, the fullness of which is still unattained.

The steam engine revolutionized, by the study of thermodynamics, modern machinery in its dependence upon the principles of mechanics, the telegraph, telephone, dynamo, motor and incandescent lamp, the seemingly mysterious creations of forces which have written the word electricity larger than any other word on the life of the present, are all familiar examples, that might be multiplied a thousand fold, of the achievements of science which are changing the face of the world. Indeed, so kaleidoscopic in their rapidity and brilliancy are the applications to practical life that the average man no longer attempts to separate and distinguish them, but accepts the results as a matter of course with but vague conceptions of the extent and intensity of the influences they exert. A great discovery apparently stirs only a passing ripple. Heralded in large type in the newspapers it is the wonder of today, to be forgotten tomorrow. But though to the world at large it may seem to be merely another incident to be placed in the tabulated record of events, in reality each new fact is a new factor which, though often dormant for a time, sooner or later becomes of determined moment. As Du Bois Raymond has somewhere remarked, "There is no abstruse investigation into nature that does not at some time have its

practical application," and, today, the some time is generally now. The discharge of electricity through gases, the propagation of motion in an hypothetical ether, seem, in so far as any relation to life is concerned, as intangible as the phantasms of a dream; but already the Röntgen rays are the servants of the surgeon in every hospital and wireless telegraphy is an accomplished fact. Nor are these accidental or isolated cases. A spirit born of the truths already won is impelling us onward in every line of work in a search for knowledge which may meet some need of man, and each day is witness of the changes wrought. The day of cut and try is past. The chaotic results of haphazard methods are no longer possible in the close competition in which the elimination of waste of energy or material is a paramount necessity. Look where we may, study whatever branch of industry we please, we find that from the crude material of the field or mine to the finished product of the factory each and every stage of the processes employed is dependent upon scientific study and investigation. The world has recognized that the theoretical is the antecedent of the practical; that success in the latter is measured by our knowledge of the power, and that the mastery of nature means the mastery of life.

In the illustrations we have given we have confined ourselves to the so-called physical sciences, because to them, in their control of the mechanic arts, the progress of industry is largely due, but in reality this is a limited view of the subject. No one branch of science can be thus separated from another. Chemistry, geology, biology, astronomy, have each as well wrought a work which if less striking to the eye is no less of vast importance. Acting and reading, in their mutual dependence, all phases of scientific inquiry are but terms of the equation, the solution of which is the order of nature. In the trite but pregnant popular phrases the present is the "age of steam," the "age of steel," the "age of electricity," but to the man of broader views it will ever be the age of science. Confined to no one race or region, limited by no bounds, science is exerting an influence the measure of which is beyond our ken. Revivifying the old, reaching forth to the new, in advance of the present and yet of the present, it has "driven far back round the full circle of natural knowledge the dark clouds of the unknown which wrapped us all about," and has opened rifts through which we catch glimpses of the yet unattained, inspiring us with the belief

that the achievements to come will eclipse even those of the past in their effect on the peace, prosperity and happiness of mankind.

Recognizing, then, this marvelous growth of scientific activities and its important bearing upon the material development of this century, let us consider in brief the question of the position of science in education. Indeed, this problem is all important today in that its solution is being forced upon us in the awakening of the popular intelligence to the real meaning of education. The world realizes that the man is entitled to be called educated who is able to use his faculties to the best advantage for the benefit of mankind, regardless, in the main, of the specific branches studied. It believes that the terms "well rounded education," "culture," "intellectuality," have hitherto stood too often for an artificial and superficial training, having but little reference to the demands of every day life, and this belief has a large basis of fact. The correlation between the intellectual thought of the school, college or university and the every day work of the world has been too little considered, and our present system of education is in many respects clearly out of harmony with this scientific age. The colleges and universities, controlled by a dogmatic conservatism that has prevented rational progress, instead of being the chief factor in human development have been far behind the times, and in their domination of the schools have caused a like condition in them from the highest to the lowest grade. Failing in the recognition of the real factors in the case, our higher institutions have attributed the chief success of their graduates to the long continued study of classical subjects, and with strange insistence have clung to curricula and methods which should long since have been discarded. The college training of the past was valuable, not because of any practical knowledge acquired thereby, but because it afforded a certain command of language and force of expression, a certain ease of manner and external polish, a certain consciousness of power which, in a community of so-called uneducated men, gave the graduate a prestige which opened to him unusual opportunities. That in the majority of cases he proved equal to the occasion was largely because those who attempted a college career were above the average in mental power, and their success in life depended not so much upon the specific character of the training received in the class room as upon natural abilities stimulated by the attrition of four years of college life. At

present, however, in the keen competition consequent to natural progress we meet entirely different conditions. The success of the individual is not dependent upon a college degree, but on his power to apply to some one of the diversified branches of human endeavor special knowledge acquired in the technical school, college or university, and the world needs his services in proportion as he is able to measure and control the conditions which the advance of civilization imposes upon us.

But it is not necessary to discuss this question further here. One has but to look over the educational field to note the great upheaval that is taking place. Old traditions are disappearing; the dogmatic adherence to subjects and methods hoary with age is at last giving way to a spirit of progress. We are building a new educational system in which the guiding purpose is to offer to every student that training which shall stimulate to the highest degree the specific abilities which he may possess.

Practical and scientific though the education may be it will be far from dwarfing the esthetic and ideal which are so essential if we are to rise above mere sordid considerations. So-called esthetiicism is too often but a cloak for weakness and inanity. The truly ideal is in reality bound by closest ties to the truly practical, for we attain the highest plains of thought and living when, with full understanding of the facts and phenomena met with in human experience, we build by means of them the path that leads above the clouds.

Moreover, it is a false ideal that fosters a training that tends in any sense to separate the individual from the world in which he lives. On the contrary, if rightly educated, he should be more in the world and of the world in that he is closely in touch with nature which conditions life. The noblest study of mankind may be man, but it is man as he is and must be, a creature largely influenced by an environment that must be understood if the chief factor in his development is to be appreciated. Instead of being relegated to the period of life when through the narcotizing influence of word study the inborn interest in natural phenomena has been largely lost the study of science should occupy a leading place from the earliest period of the student's career to its close, impregnating the intellectual atmosphere of the school and university with a conception of

the actualities and possibilities of the material universe that will remain a vitalizing influence throughout life.

The considerations just presented concerning the relation of science to the educational practice of the past and future may seem in a measure apart from the text of this article, but the meaning of the study of physics and the importance of its strong development today cannot be appreciated without a knowledge of present conditions and tendencies. It is, therefore, as one factor in this recreation of education determined by the necessities of the race in its organic unity with nature that we consider our special theme.

And first we note the necessity of a knowledge of physics to the engineer and technician. Indeed, so obvious is this that any discussion is apparently superfluous. Nevertheless, a consideration of modern technical education clearly demonstrates that there is need of its greater emphasis. While in the colleges and universities the practical has been sadly neglected in our devotion to the abstract and theoretical, in all branches of technical training the pendulum has been allowed to swing too far in the opposite direction. In our anxiety to so equip the graduate that he may be able to secure immediate and remunerative employment, specialization has been encouraged at the expense of breadth of knowledge, and facts and formulæ have too often taken the place of a comprehensive grasp of principles. Against this excess of the practical a reaction is necessary, and in fact has already begun. As has been well said, "There never was a time when, more than now, the technical man must work hand in hand with the pure scientist. The engineer who would keep up with the pace which science is making must consider himself always in the schools; he must be trying to keep step with the changes in the theory and with the growth of knowledge as proclaimed from the studies and laboratories; he must, if he would win distinction, have the training which fits him to seize the idea behind the theorist's symbols and forms and strikingly apply it to the everyday problems in which his interests and labors lie." Such a grasp of physical science as this training demands cannot be acquired from a few lectures and limited laboratory practice. Only through long continued study and investigation of both fact and theory as formulated for us by master minds can we attain that standard in technical education which shall place the engineer on a par with the inves-

tigator as a leader instead of follower in the interpretation of the sequences of nature.

Again, we remark that the study of physics is not alone necessary to the technologist, but to other professions as well. To each it bears an important relation which, though varying in degree and kind, is none the less vital. Thus, for example, the practice of medicine owes much of its progress to the assistance which the physical sciences have rendered. To quote from a recent address delivered by an eminent physician, "All recent progress in medicine has depended on research and discovery carried on by physical and chemical methods. The mechanical principles that were first applied in anatomy to the explanation of the construction and movement of bones and muscles have been carried by the physiologist into every organ of the body and into the arcana of the tissue, and have been shown to be essential to the understanding of the changes that take place in them during the performance of their functions. And at the same time the aid of chemistry and electricity has been invoked to drive back step by step that vitalism which was at one time all but supreme in the domain of animal physiology. Helmholtz, in his great work on vision and hearing, was the first to show how physics mounts into physiology and psychology, and after him Weber, Fechner, Lotze and Wundt have, step by step, pushed forward the parallels of the material accompaniments of thoughts and feelings." In practical medicine the microscope, thermometer, ophthalmoscope, laryngoscope and a host of mechanical, optical and electrical appliances, attest the fruitfulness of the concepts of physics as applied to the study of disease, and while their use may not be confined to those who fully understand the principles involved, we can look for future progress in similar directions only to those whose training in exact science is not confined to the peurile knowledge of physics and chemistry which too often obtains.

Admitting, however, the evident bearing of physics upon professions of a scientific character, the question might be raised as to what possible connection it has with others equally important, but of a different nature. What, for instance, have the rules and precedents of legal procedure to do with pure science? Our answer is, that the lawyer, of all men, requires the broadest education, and especially in those directions which shall put him most closely in touch with the work of the world. In the countless legal cases which

involve the use of modern machinery he should be able to comprehend, at least in a measure, the principles involved and to ascertain the bearing of the evidence adduced. Moreover, to him as a lawmaker an understanding of the paramount influences in commercial progress is essential for a correct appreciation of the real needs of the people to be expressed in public enactments. Indeed, from a broader point of view, there is no education more fitting for the lawyer or future politician than the scientific, for its guiding principle is the search for truth. Reasoning from the known to the unknown, putting everything to the crucial test of experiment while leaving nothing untried, worshipping no fetish, holding to a theory only as far as it can be substantiated by fact, science is the embodiment of that spirit which should govern our institutions and interpret our laws, the spirit of truth and progress which alone can successfully control men and things.

To consider thus, even though briefly, the value of this study from all the varied aspects of professional life would be beyond the limits of this article, but we cannot close without a reference to its meaning to the leading profession of all, that of teaching. In its relation to the new developments of science teaching in the schools its importance is indeed paramount, but it is not our desire here to enter into any consideration of this particular question, vital though it may be. There is, however, another view of the connection between our theme and the practice of teaching which demands attention, and to this we turn. The history of modern pedagogic art shows in its detail and extension the predominance of that mode of thought which finds its ideal in the inductive methods which are exemplified in physical science. Nor has this attitude of mind been confined to those branches of knowledge of which it was the inception, but all have in one manner or another been recipients of the benefits it has brought. Even the study of the classics, which of all subjects we might consider as most completely formulated through generations of teaching, has in recent years been entirely remodeled in accordance with what are known as scientific methods. So, too, we speak of the science of history, the science of political economy, the science of literature, the science of philosophy, recognizing in the use of these terms their dependence upon the fundamental concepts of scientific thought, for an understanding of the social organism or the individual being. But, scientific though they may be in

part, no one or all of these subjects can give in full measure that training which shall enable the teacher to guide, control and mold that embodiment of nature, the mind of youth. To drink of the sparkling waters which gush forth from the native rock uncontaminated by soil or air one must go to the fountain head, and, if the teaching of any department of life or thought is to be governed by that scientific spirit which each claims to recognize, it must be sought through the ideas to which it has given birth and in the laboratory methods which it formulates and controls. To the prospective teacher of any topic the study of physics, as exemplifying in fullest measure this spirit of creative truth, will prove a broadening and strengthening influence, a stimulus and also a guide in the working out of the problems of education upon the solution of which the future depends.

In this discussion, hitherto, we have confined ourselves to the more practical side of the subject, and have dwelt upon the bearing of physical science upon technical and professional training, apparently disregarding that great body of students who, without definite aim, seek what is termed a "general education." In point of fact, however, the considerations presented apply equally well to them. Every one of life's activities is in reality a profession, and in each a knowledge of nature and her laws is necessary for a co-ordination of education with life as it is and will be. There are but two factors in human existence, mind and matter, and to neglect either means a loss of power. History, literature, philosophy, and ethics have a marked value in any scheme of education, but without the vitalizing conceptions of nature they fail to attain the desired end. The fulfillment of the broad ideas of modern school, college or university work requires the union of science and the humanities in a harmonious whole with such adaptations to the mental abilities and needs of the individual student as shall tend to his best development. For, indeed, there is a something to be learned from nature that cannot be found in books. "The mastery of nature is increasingly a mastery of mind," an increasing power of independent thought and action which marks the truly educated man and raises him above his fellows in his control of that which is and his perception of that which is to come. From the dicta of the humanities science calls for a contemplation of the thoughts of God as expressed in nature, and when studied aright leads to a recreation of ideals in harmony

with the progression of the ages as determined by the infinite mind. To this high standard but few may attain, for to the many is not given that genius of mind and soul which it demands, but the spirit that science breathes can be felt in some measure by all who put themselves beneath its influence, and in this its largest value to every student lies.

In closing, one further thought calls for consideration, for without it the conclusions we have drawn become, in a sense, vague and purposeless—namely, that to afford this quality of mental discipline which we have claimed as its attribute physics must be properly taught. So definite is this that the merest mention of the fact seems all that is necessary. Yet an examination of the equipments of many institutions shows that there is but a vague understanding of the material conditions which make possible a study of even the most elementary principles. Nor is this surprising. From the sterile teaching of the past to the practices of the present has been so rapid a progress and fraught with so many organic changes in general plans and specific methods that there is not merely among the public at large but often in our faculties and governing bodies a real ignorance of the essentials for scientific work of any character. So, too, even where fully appreciated, the large outlay of money which is required for the modern laboratory, with its extensive equipment of expensive apparatus has often prevented rational progress. In consequence the man of science, confronted with inadequate resources and with insufficient funds at his disposal is forced by the universal demand for progress and the desire to teach in a manner worthy of his ideal, to make constant appeals for aid, requests which, in their repetition year by year, come to be considered as the unnatural cravings of a morbid appetite. In some of our larger universities, through the generosity of individuals, relief has come, but these instances are all the more strongly marked because of their isolation. We need today, above all else, an awakening of intelligence in these matters; the world must be reinformed that the generalities of the ordinary text-book, the scattered illustrations of the lecture room, the dry logic of the mathematical treatise are not the sum and substance of physical science. Only through constant practice in the laboratory, through practical study of phenomena by the aid of exact instruments can we secure that knowledge which we have shown to be so essential to every man. As the basis of all

technical studies, as a formative influence in professional life of every grade or class we plead for such a conception of the value of physics and such an understanding of its needs as shall foster its development along those lines in which alone experience has shown success to lie. To build a secure foundation will, it is true, require large expenditures, but the returns are not to be measured in cash values. As Dr. Welch has aptly said, "Costly as may seem the establishment and support of a good laboratory, the amount of money thus expended would seem to us ridiculously insignificant if we could estimate the benefits to mankind derived from the work which is done in them." As Wurtz also has remarked of the money required for laboratories, "It is capital placed at a high rate of interest, and the comparatively slight sacrifice imposed upon one generation will bring to following generations increase of well being and knowledge." This is not sentiment, but fact. A realization of it has made the universities of Germany the gathering places for men of science of every race, and the German nation a competitor for the markets of the world. Would we here reap like benefits we must bestir ourselves and make a strong beginning along similar lines. For the university that, inspired by a recognition of these high ideals, shall arrange a curriculum strong in the realization of the value of science with all the material equipment which it demands a future of brilliant success is secure. In the institution so governed and guided the study of laboratory science, in correct relation to other branches of knowledge, will reach a development hitherto unknown in this country, rivalling that which has made foreign universities our acknowledged superiors, and in like manner exerting a tremendous influence on the mental and material growth of the masses within its reach.

THE SCOPE OF MODERN GEOLOGY.

FREDERIC W. SIMONDS.

The literature of a science is a record of its achievements, a history of its growth and development. By it is shown its scope or range, its affinities and relations. In the many and varied contributions to geology one cannot fail to recognize that this great branch

of human learning has, within the last few years, become wonderfully expanded—differentiated—so that instead of "geology" the needs of accuracy would be better served by the term "geological sciences." The tendency of the age is toward what may be well called *selective grouping*. Specialization has opened up so many lines of research, methods of investigation have become so numerous, the ever-widening field of study has become so large, that the erection of groups of closely allied sciences in the place of the parent seems, in most instances, desirable. The phenomena comprehended under geology are already so many that the designation "geologist" gives but an indefinite clue as to the kind of investigation the worker pursues. A "geologist," from my point of view, is more than a teacher or student of geology—I use "student" in its narrow sense—he must be a contributor to knowledge. But the lines of investigation have become so diverse that the life-span of an individual no longer admits of perfection in all. He is limited to a specialty, hence, instead of "geologist," a more distinctive term should be employed, one indicative of the phenomena with which he has to deal.

Just here a most important question arises, viz.: What is the scope of modern geology? What phenomena or groups of phenomena are associated under that name? One of the most gifted and influential writers of modern times, Sir Charles Lyell, has defined geology as "the science which investigates the successive changes that have taken place in the organic and inorganic kingdoms of nature; it enquires into the causes of these changes, and the influence they have exerted in modifying the surface and external structure of our planet."*

While this is a masterly conception, a broad, intellectual, and scientific view, is it sufficiently comprehensive for present needs?

An eminent Scottish philosopher, Bain, has defined a science as "an aggregate of knowledge whose particular items are more closely related to one another in the way of kinship than to any other collective mass of particulars."† Does this apply to geology?

It is a well-known fact that many geologists enter upon their professional study through the avenue afforded by biology—itself a composite science, or a group of sciences, embracing such units as zoology, physiology, histology, botany, and the like—that is to say,

*Principles of Geology, Eleventh American Edition, Vol. I, p. 1.
†Mind, Vol. XIII, p. 527.

they approach geology from the *organic* standpoint. And their training serves them well for certain aspects of the science, towit, the study of stratigraphical and historical geology, involving a consideration of past faunas and floras either for the purpose of identifying strata or for establishing the succession and evolution of life on the globe. But how illy equipped are they for the intelligent study of certain other aspects, such, for instance, as the phenomena attendant upon volcanic eruptions, or seismic disturbances, which present problems of the profoundest character in physics? Of what value, it may be inquired, is such training for the study of rocks, especially the massive and schistose groups? Of what assistance in determining the worth of coals, oils, gas, and mineral deposits in general? Recognizing this a second portal has been opened through chemistry and physics—that is, geology may now be approached from the *inorganic* side. Accordingly in several of our larger universities chairs of petrography have been established based upon chemistry and mineralogy; dynamic geology, based upon physics and chemistry; and in one, Johns-Hopkins, a chair of geological physics has been established with "laboratory experimentation along the physical line of geological research."*

While the stratigraphical geologist occupies a field distinctively his own, his knowledge is supplemented by an understanding of paleontology, which, having for its domain the consideration of fossil remains, especially their classification and description, must be grouped with the biological sciences. The dynamic geologist, on the other hand, also occupies a distinct field of research; he must consider the forces of nature, chemical and physical, and the results of their action. How widely and fundamentally different is the work of these two specialists? Between the study of vulcanicity and the order of superposition of strata there can be little in common, and, moreover, the methods of investigation in the two cases are very dissimilar.

How different, again, the phenomena of glaciation, which, since the discoveries of the elder Agassiz have furnished such a fruitful field of research, and the phenomena of vulcanicity? Such a comparison serves to show how wide may be the diversity within such a well-established unit as dynamical geology.

*American Geologist, May 1893.

But, during the last quarter of a century, petrography, or the microscopic study of rocks, has sprung into existence, a science in itself, another member of the geological group. It utilizes optical mineralogy, hence is a physical rather than a natural science; it employs, also, the methods of the biologist to a degree, yet the character of the microscopic examination is different. While it may be used in the study of all rocks, its domain is chiefly with the massive and schistose rocks—that is, it affiliates with geology on the inorganic side.

In the light of what has been set forth does geology conform to Bain's definition of a science? Is it an aggregate of knowledge whose particular items are more closely related to one another in the way of kinship than to any other collective mass of particulars? Plainly the relationship between, for example, petrography and glaciation, or vulcancity and stratigraphical geology, is not so close as between chemistry and physics, both of which are based upon the attraction and repulsion of matter. Yet chemistry and physics have long been regarded as independent, though closely related sciences. Again, between structural and stratigraphical geology there are points of great dissimilarity; the former has to do largely with the morphology of strata, the latter with the succession or chronology of strata; the former deals with the results of dynamic action, the latter with the history of earth-building and the succession of life as recorded in its strata. For the investigation of the first group of phenomena the observer must possess a knowledge of physics; for the investigation of the second group, a knowledge of the biological sciences. The interpretation of strata as well as their correlation depends upon an intimate knowledge of fossils—paleo-botany and paleo-zoology—hence while structural geology is closely identified with dynamic geology, paleontology is the chief foundation stone of stratigraphical and historical geology, and a knowledge of that subject becomes a *biological* necessity to the student who would enter such fields of research.

Without going farther, my contention that geology is a group of sciences rather than a single science would seem justified.

Thus far I have considered geology—or the geological sciences—in the light of *pure* science. Phenomena of various kinds have been classed with their proper units regardless of any practical bearing they may have upon man and his surroundings. A certain unit

may be concerned with investigations relative to the "successive changes that have taken place in the organic and inorganic kingdoms of nature"; another may be concerned with "the causes of these changes"; and another still with the "influences they have exerted in modifying the surface and external structure of our planet." But this is not all. Since the day of Lyell new units have appeared. Passing such additions as petrography and physiography, I come to the consideration of geology as an agent in promoting man's material comfort and wealth. During the last few decades applied sciences have advanced with wonderful rapidity, and in the general advance we find the practical application of geologic truths taking the form of "economic geology" from which there has recently been differentiated the study of "ore deposits." Here the lofty sentiment of Lyell yields to the practical demands of the day; here the application of stratigraphical geology, for instance, is to the question of coal occurrence, oil, gas, and artesian water, rather than to "successive changes" as shown in strata and their contents. Great surveys, both national and State, have been organized not only for the purposes of pure science, but to investigate the mineral resources of our country and to promote their development. The importance of such research can scarcely be estimated. Already enough is known to place us among the favored nations of the world and the work has just begun. With iron from our mines we have spanned a continent and knit into a compact whole a great people; with gold and silver we have reaped material advantages hitherto unknown; with phosphates from our bone-beds we have reclaimed our exhausted lands; and with artesian water transformed waste places into veritable gardens. And this is not all; through the skill of the economic geologist the areas of workable coals have been widely extended; copper, lead, and zinc have been discovered in almost inexhaustible quantities; and natural oils and gas have become factors in modern civilization. It would take pages to record the achievements of this branch of applied science. Yet many States, shortsighted in policy, unmindful of the practical value of geology, either fail entirely to provide for the determination of their resource by competent investigation, or subordinate the office of State geologist to political ends.

Geology, then, cannot be regarded otherwise than a group of allied sciences; in the extremes we find sciences more diverse even

than chemistry and physics, or zoology and botany. In its modern aspect it embraces not only sciences which rank as pure, or theoretical, natural and physical, but economic as well. What, therefore, is the scope of modern geology? The widest, I would answer, of all the sciences. Between the biologic sciences on the one hand, and chemistry and physics on the other, stand the following units: historical, stratigraphical, structural, and dynamic geology, physiography, petrography, and economic geology, including "ore deposits."

That geology, as a study, should be especially attractive to students is not surprising, since it brings them in contact with phenomena of the most varied kind and gives them a view of nature as yet unexcelled.

THE STUDY OF ZOOLOGY.

WILLIAM MORTON WHEELER.

"For direct self-preservation, or the maintenance of life and health, the all important knowledge is—science. For that indirect self-preservation which we call gaining a livelihood, the knowledge of greatest value is—science. For the due discharge of parental functions, the proper guidance is to be found only in—science. For that interpretation of national life, past and present, without which the citizen cannot rightly regulate his conduct, the indispensable key is—science. For the most perfect production and highest enjoyment of art in all its forms the needful preparation is still—science. And for purposes of discipline, intellectual, moral, religious, the most efficient study is still—science."—*Herbert Spencer.*

Affection for animals is, next to that for our own kind, one of the most fundamental of human traits. The normal manifestations of this fondness for organisms endowed with faculties imperfectly but indisputably like our own, are, perhaps, more marked in childhood—as they were during the earlier history of the race—but they never wholly disappear even with advancing age. The keeping of pets, the hunting and trapping instinct, the collecting of animals for aesthetic or scientific purposes, the raising of stock, poultry, bees, have been the delight of a large proportion of the human race in all countries and in all times; and it is very probable that this delight will never be diminished by the introduction of automobiles,

the artificial manufacture of milk and eggs, or by any other inventions which may render animals less useful and merely ornamental.

The intensity of this love of animals is most clearly seen in its abnormal phases, which, of course, pass by imperceptible gradations into the sane and normal manifestations above mentioned. The mania for collecting zoological specimens, not from any scientific or aesthetic interest, but merely for the purpose of satisfying an abnormally developed acquisitiveness; the evils of horse racing, bull fighting, and cock fighting; the excessive fondness for hunting, which has led to the extermination of the larger indigenous mammals of Europe, and is rapidly exterminating the bison of America, and the antelopes and other large ungulates of Africa; the vagaries of breeders, like the production of pouter pigeons, pug dogs of hideous aspect, gold fish with protruding eyes and abnormal tails; the desire to perpetuate through artificial selection the abnormalities and "freaks" which appear from time to time as so-called spontaneous variations among our domestic animals—these are some of the excrescences of this universal and deep-seated love of animal life.

Considerations like these would obviously furnish grounds for undertaking a deliberate study of Zoology, or the science of animal life, in our schools and universities. But there are far more cogent reasons for assigning to Zoology a prominent place in the educational curriculum, and these reasons have been increasing in weight and force *pari passu* with the departure of scientific thinkers from the attitude of the ancient and mediæval mind which insisted on the immediate reference of everything to man as the norm and measure of all things. To the superfical observer the scientist of today seems to have lost interest in man—and the myopic "humanist" in educational circles is one of the most superficial of superficial observers—but the closer student of human nature must admit that man's interest in man has been constantly increasing through the ages and must continue to increase. To the scientist man is still the Omega of the phenomenal universe, but the adequate understanding and consequent amelioration of this most complicated paragon of animals depends to a large extent on a temporary suspension of our interest in him as man. In simpler words, we no longer begin our study of the universe with man, but with the phenomena exhibited by non-living and by living matter in a simple condition, in the hope

that some day man, who still remains the load-star of our interest, may be the better understood and benefited. That this hope has not been futile is shown by the benefits which science has already bestowed upon us. We need consider only one example—that of the study of micro-organisms. Of all living things these are certainly the most remotely related to man, and had not the interest of scientists in man and his welfare been temporarily suspended till they had obtained some knowledge of the structure and physiological and chemical properties of micro-organisms and of their reactions on lower animals, we should not today be blessed with antiseptic surgery, with an enormously lessened mortality in diphtheria, lock-jaw, and rabies, and with an improved prophylaxis in a score of other terrible diseases. This temporary suspension of interest in man as man is, in a sense, *the* scientific attitude of mind when it is born of the conviction that man is only a part of a very complex set of phenomena, the understanding and utilization of which must depend in the first instance on a concentration of research on the simpler and more accessible phases of the problem.

The necessity for a temporary suspension of interest in man is here emphasized because Zoology is a science to which this consideration is clearly applicable. Although Anthropology is really a department of Zoology, *sensu lato,* convenience has necessitated its separation. As usually understood, Zoology includes only enough of the study of man to do justice to the comparative aspects of the science. In a sense Zoology is *the* study of all others which leads most directly to an understanding of the human species. Man is the final result of a long and intricate development extending through the unmeasured past. The science of history is necessarily limited to a tiny fragment of this enormous period—the vastly greater and in many respects the more significant portion of man's development, antidating all history, can be dimly traced only in the structures and activities of the animal organisms more or less closely related to man through the bonds of hereditary ascent.

In obedience to the laws of differentiation the science of Zoology has, during a little more than a century, split into several subordinate sciences of different dignity, developed by different methods and pursuing different aims. Several of these subordinate sciences figure more or less prominently in our university circulars, but their scope and bearings are not always clearly understood by those inter-

ested in other branches of knowledge. For this reason it has seemed well to give in the following pages a brief outline of the various zoological disciplines with some comments on their theoretical and practical value, both as preparing the student for a more intelligent study of other sciences and as a necessary foundation for further specialization along strictly zoological lines.

Comparative Anatomy. This may be regarded as the basic study in Zoology. It deals with the structure of animals so far as it may be investigated by means of dissection or other methods (injection, corrosion, etc.) which do not require the aid of the microscope. The diligent prosecution of this study as an eminently *comparative* study has shed a flood of light over the whole subject of Zoology. The exhaustive study of the structure of single forms (i. e., special anatomy), without reference to one another, is valuable, to be sure, but it suffers from serious limitations. This would be the case with human anatomy, *e. g.,* were it not for its great compensatory practical value in surgery. As it is, even human anatomy has gained enormously by the development of comparative anatomy. "You understand a particular kind of animated being, when looking inwards you see how its parts constitute a system, and again looking outwards and around, how this system stands with regard to other types of organized existence." Indeed, the aid which human anatomy derives from comparative anatomy is so great that no medical student can afford to be ignorant of the leading facts and principles of the latter science. It may be a question whether it should precede or follow human anatomy in the university curriculum—on this point anatomists may have different views. As our universities and medical schools are constituted at present, there can be no doubt that comparative anatomy should precede human anatomy in the college or university. This arrangement is, moreover, rendered more practicable because comparative anatomy has won for itself a position in the university curriculum on other grounds than as a preparation for medicine. It is even more necessary as a preparation for veterinary science. No one can be an adequately trained veterinarian without some knowledge of the comparative anatomy of our domestic animals, and much of this knowledge can be supplied in our colleges and universities. Some acquaintance with anatomy, both human and animal, is also necessary to the artist who would give us something more than mere color,

bad drawing and worse modeling in his representations of men and animals.

As a study pursued for its culture value alone, comparative anatomy is important because it enables a man to orient himself from the merely physical side of his nature. This orientation is, in a sense, the only rational basis for his attitude towards the animal world, and the understanding which it furnishes of the fundamental similarity of his structure with that of animals and the physiological and psychological similarity therein implied, should make any form of cruelty to animals impossible.*

Microscopical Anatomy—usually known as Histology and Cytology—is a further extension of anatomy into the realm of structures which can be studied only by means of optical instruments of considerable magnifying power. The domain of histology and cytology embraces the tissues which form the various organs, the cells composing the tissues, and the parts of the cells down to the limits of visibility. As these limits are very far from coinciding with the atoms and molecules postulated by the chemist and physicist, microscopical anatomy, though inclining more and more to a recognition of the chemical and physical processes involved in the life of the cell, remains, nevertheless, like gross anatomy, an essentially morphological discipline, i. e., a study of form and structure. Like anatomy it derives much of its force and value from the employment of the comparative method.

The practical value of microscopical anatomy may be said to be constantly increasing with an increase in the practical importance of the study of micro-organisms, or the minute animals and plants which engender diseases in the body of man and the higher animals. This study of the diseased tissues and organs, the science of pathol-

*I am aware that the existence of vivisection may be advanced as contradicting the statement here made, but this can only be from lack of personal acquaintance with physiologists. I am certain that I have never known a vivisectionist who did not deeply regret the fact that he was sometimes obliged to inflict pain on a few animals or be forever barred from the investigation of certain truths. I venture to state, moreover, that in the opinion of most biologists vivisection should be permitted only to competent investigators for the purpose of establishing new facts and principles and that its use for mere demonstration of well-established truths should be restricted. That it has no place in the high school, college or undergraduate classes of a university goes without saying.

ogy as one of the most important subjects in the medical curriculum, must be preceded by a study of normal histology. The student must become familiar with the typical appearance of the various cells and tissues of the body during health before attempting to study diseased tissues. As human cells and tissues are almost or quite indistinguishable from those of animals, it is obvious that normal histology can be readily taught in our university laboratories. Clearer conceptions of the normal tissues are possible through the employment of the comparative method of study and the opportunity this affords of selecting for special investigation the most striking cells and tissues from the whole animal kingdom.

The culture value of histology is considerable, since it furnishes the necessary preparation for the study of growth and development, including the problems of heredity and sex. Through the intricate and delicate technique of the laboratory it furnishes no little training in careful manipulation and observation. For this reason alone it is rightly assigned an important place in the zoological schedules of our colleges and universities.

Development, or embryology, as it is more frequently called—although this latter term is in reality somewhat narrow—embraces the study of the changes of form undergone by the animal in passing from the egg to maturity. It goes further and seeks to establish the laws of these changes in form and growth. At the present time it has, perhaps, little practical value, and this only as a propedeutic, or preparatory course leading to gynæcology and obstetrics in medicine. But its promise for the future is immense, since from the long and serious prosecution of this science must come the establishment of the laws of sex and heredity, than which no phenomena in the whole world are more urgently in need of elucidation on purely practical grounds alone.

The value of embryology as a study which sheds light on a dozen other sciences cannot be too highly estimated. From its very nature the study of development—the science which attempts to explain through what processes animals have become what they are—must illumine the very depths of all other zoological disciplines. Embryology has become more and more what Karl Ernst von Baer, the father of the science, called it—the true bringer of light—the Lucifer of Zoology, if this word may still be used in its original Latin sense. Only in its effulgence are the facts of anatomy, of physiology,

of geographical distribution, of a score of other subjects—seen in true relief and perspective. The living world is conceived as an expanding, developing unit full of endless possibilities. Surely there is no other subject which so immediately places the student on the proper eminence from which to view not only matters of a zoological nature, but other subjects of the greatest practical and theoretical value—like psychology, ethics, political science and history.

Physiology. While the study of anatomy, both gross and microscopical, may be prosecuted with a measure of success on dead animals—since it deals very largely with form in a stable, or statical condition—physiology is the study of the living and functioning organism *par excellence.* It cannot ignore structure since function in one sense depends on, and in another sense dominates structure. Structure and function are inseparable aspects of all life phenomena. This statement does not cease to be true even if function be reduced in last analysis to the interatomic phenomena of chemistry.

Physiology in its development clearly illustrates the retarding influence of the anthropocentric notions referred to in the opening paragraphs of this article. The older physiologists had an admirable conception of their science as based on the comparative study of function in all living things. Nor was this comparison to be restricted to the functions of maintaining the organism at a certain level of vital activity, but it included also the functions of growth and development. It has been left to more recent physiologists, developed largely under the influence of medical instruction, with special ends in view, to demonstrate *ad oculos* the serious limitations of work on the maintenance functions alone of man and a few of the higher animals, the frog, the dog and the rabbit. Physiologists of a broader view are returning to the earlier attitude of their science, with keener interest in the more general aspects of life phenomena and abated interest in the stimulation of the mammalian vagus and the rotation of the kymograph.

That a science like physiology, directly concerned with *the* vital processes, is of the highest practical value cannot be disputed. Health, which we all sooner or later come to regard as the greatest of blessings, has existed and can exist in communities ignorant of the rudiments of physiology. Indeed, the human race would now be in a sorry plight, if this were not the case. But health is becoming more and more difficult to maintain as civilization with its thou-

sand exigencies takes firmer hold on mankind. Public and personal hygiene have become a necessity and will ultimately be a matter for detailed and severe legislation. The school in this or any other country that can turn a child out into the struggle for existence destitute of some knowledge of its bodily functions and of the best methods of guarding against contagious diseases, is derelict in its very first duty to the human race. The Laps and Esquimaux who inhabit regions of the globe comparatively free from disease germs may be forgiven if they give more attention in their higher schools, if they ever have any, to a study of the classics than to the conditions which insure a healthy mind in a healthy body—but educators in sub-tropical or tropical countries cannot be released from the responsibility of fitting their pupils with some sound knowledge of physiology and its application, hygiene. What Huxley said on the subject of physical science teaching in England is eminently true of many schools in our own country and at the present time: "Physical science, its methods, its problems, and its difficulties, will meet the poorest boy at every turn, and yet we educate him in such a manner that he shall enter the world as ignorant of the existence of the methods and facts of science as the day he was born. The modern world is full of artillery, and we turn out our children to battle in it, equipped with the shield and sword of an ancient gladiator. Posterity will cry shame on us if we do not remedy this deplorable state of things. Nay, if we live twenty years longer, our own consciences will cry shame on us. It is my firm conviction that the only way to remedy it is, to make the elements of physical science an integral part of primary education." There can be little doubt that in any scheme of elementary education in physical science proposed by Huxley or by any other broad-minded scientist, some knowledge of the human body, its functions and the best means of acquiring and maintaining health, would hold the very first place.

Natural History—the "Biologie" of German, the "Oecology" of American writers—is a time-honored branch of Zoology—which, however, has passed through the anecdotal stage and is now being placed on a scientific basis. It deals with the relations of animals to one another and to their environment, and comprises such subjects as symbiosis and parasitism, the sexual relations of animals, the various forms of family and social life among animals, their

nest-building, breeding and feeding habits, together with the comparative study of instinct.

Natural history, too, has its theoretical and practical value. It leads to a deeper and truer knowledge of those fundamental life phenomena, adaptation and variation. It also leads to the establishment of some of the fundamental data of psychology, sociology, ethics and pedagogy. No branch of zoology is so fascinating to children. For this reason alone it commends itself as superior to all other zoological disciplines for purposes of elementary instruction. In co-operation with botany and physiography as "Nature Study," natural history is gradually replacing the abstruse morphology and classifications which some teachers of science have introduced into the secondary schools.

The benefits of properly conducted instruction in nature study will be immediate, for the ignorance of the average American child concerning our most common animals is unparalleled in any civilized country. This ignorance is reflected in our spoken language which abounds in misnomers. Beetles are called "bugs," scorpions "stinging lizards," salamanders "lizards," etc. Even our written language has been vitiated by this lack of elementary zoological knowledge. A luminous beetle is called a "fire-fly," or even a "lightning bug," one of the lizards is called a "horned toad," a rodent, allied to the marmots, is a "prairie dog," a very primitive salamander a "water dog," etc. Let any one, who cares to determine to what extent ignorance and superficial observation can vitiate a language, compare our English names of animals with their German equivalents.

Two illustrations of the immense practical value of the study of natural history may be cited. It is a well known fact that man and his domestic animals are often attacked by parasites—like the trichina, tape-worm, round-worm, filaria, live-fluke, and others too numerous to mention. It is, moreover, a matter of common knowledge that infection with these terrible pests has often resulted in serious illness or death. It is now a comparatively easy matter, since nearly every detail of the wonderful habits and life histories of these parasites has been made known, not only to preserve the life of the infected man or beast, but to stop the very sources of infection.

Of even greater practical value has been the study of the habits

and life histories of other noxious and beneficial organisms. The vegetation of the globe may be said to be always engaged in a struggle for its very existence with that most exuberant and dominant group of animals, the insects. In this struggle our crops and orchards, as well as our forests, are often worsted. Everybody knows of the depredations of the gypsy-moth, the chinch-bug and the Hessian fly, the potato-beetle, and the boll-worm and boll-weavil of the cotton. Nor is it necessary to dwell on the serious economic effects of these depredations. It is, however, well to emphasize the fact that in dealing with the ravages of insects knowledge does not cease to be a power. This has been amply demonstrated by the labors of the U. S. Division of Entomology at Washington and by the entomological departments of our State universities throughout the country.

Geographical Distribution.—The study of geographical distribution aims to determine the exact area and position occupied by each species of animal, both on the land surface and in the fresh and salt waters of the globe, and to account for the facts of this distribution. The study is still in its infancy and its bearings on other branches of zoology are only beginning to be appreciated. During the coming century, which will be replete with labor along these lines, the limits of faunas and the species composing them will be determined with great accuracy. The practical benefits accruing from this study when further developed can be dimly foreseen. Not only will it be possible to settle without the waste of time and money entailed by crude empiricism, the regions best adapted to the various breeds of domestic animals, but an accurate knowledge of the migrations of our food-fishes, game birds, etc., subjects which properly fall within the province of the student of geographical distribution, will enable us wisely to exploit the resources of our country without the destructive waste at present in vogue.

Paleontology.—What the study of geographical distribution attempts to do for the spacial relationships of animals the science of paleontology attempts to accomplish for their distribution in time. As commonly understood, it treats of the animals—mostly extinct—that lived during bygone geological ages. To the zoologist the data of paleontology are of the greatest theoretical value as constituting the most objective evidence of evolution, to the geologist these

data are indispensable because by their aid he is enabled to co-ordinate the facts of his own science. For these reasons paleontology holds a place in the curriculum of the college and university. Here its closer and more practical associations are with geology. Since, however, the difference between living and extinct animals is an artificial one—for existing animals are constantly becoming extinct—and since, moreover, the structure of extinct animals, which are always preserved in a more or less fragmentary condition, can never be fully understood without reference to forms now living, it must follow that paleontology can be separated from zoology only on grounds of expediency and personal interest.

Classification, or Taxonomy.—This branch of zoology, from the technical nature of its expression, often has the appearance of great accuracy and scientific value. Starting with the marvelous fact—inexplicable except on the theory of evolution—that animals are naturally grouped in categories of varying size and dignity, and with the similarly inexplicable facts of the individual and the species—taxonomy attempts to tabulate animals in such a manner that the degree and character of the affinities resulting from their organic inter-relationships shall be concisely and truthfully expressed. As we are still very far from possessing more than a few of the data necessary for this expression of affinities, taxonomy even in its present form—the result of vast labor and acumen—is scarcely more than a provisional inventory of our zoological stock, the animal kingdom. Such an inventory has, of course, the great practical value of all inventories. Its careful study is instructive, if only as a study of the ingenuity, patience and learning of other individuals of our species. But the fact that this inventory is in a state of perpetual flux, since it is being continually altered and improved from day to day as our knowledge of the animal world expands, makes it an undesirable subject from a pedagogical point of view. For this and the further reason that its very intricate and to some extent arbitrary Græco-Latin terminology has in itself no educational value, a detailed study of taxonomy can claim no place in the college or university class-room. It certainly has a place, however, in the laboratory and museum.

SOME PRACTICAL PHASES OF THE STUDY OF BOTANY.

WILLIAM L. BRAY.

The resources of the commonwealth of Texas are above all dependent upon plant life. Her three overshadowing interests, agriculture, cattle raising, and lumbering, are the direct result of the exploitation of plant life as represented first, in cotton and cereals (corn, wheat, oats, rice), second, in native and cultivated grasses and forage plants, and third, in valuable timber trees. The continued profitable exploitation of these interests will depend upon the perfection of a rational method of procedure. Such a rational method involves an intimate knowledge of plant life. This knowledge of plant life must be acquired by dealing with the living plants themselves, and it may accrue from either or both of two methods of procedure: First, from the long continued practice of cultivating or otherwise exploiting plants for purposes of financial profit. This is at best a slow method, and since the main object is the profit arising from cultivation and experimentation, the fundamental facts of plant structure, life processes and needs are not arrived at, and countless haphazard guesses and failures accumulate before that concensus of experience is arrived at which is found to yield the best results in the cultivation of any given crop. Second, such an intimate knowledge of plant life may be acquired from the direct and intensive study of plants growing under control and with experiments directed toward specific ends; from the study of plant life in all forms from the lowest to the highest; from the study of vital processes of living plants, assimilation of food, breathing, reproducing their kind; from the study of the constituents of plant food, the relation of plants to the soil in which they grow and to other factors of their environment.

Of course, all that is implied in the second process may be accomplished without acquiring the ability to raise a crop of any kind whatsoever successfully, but the cultivation of crops, based upon this exact and detailed knowledge, will, in the end, yield far greater profit with greater economy of effort. A physician who had little training in medical school and hospital may have come to excellent

standing and great success in dealing with disease, merely from his long continued experience with patients, but men, starting out on that basis now, can not expect to compete with those who have had intense and specific training for four or six or eight years in well conducted medical schools and hospitals. Our social conditions demand accurate knowledge and well directed preliminary training. Similarly, the social conditions will presently demand that agricultural, forestry, and grazing enterprises be based upon accurate knowledge and well directed study of those things with which they deal; namely, plants in particular, otherwise the exploitation of these things will not keep pace with the demands of the times. A glance at some of the older communities shows how social conditions demand a detailed and accurate knowledge of plant life. In France, for example, conditions make "intensive farming" necessary. We say "they go at it scientifically." In no other country in the world are there so many special agencies devoted to a close study of plant life and well directed experimentation with plants. As a consequence, botanical literature is full of contributions from French writers to our knowledge of the profitable cultivation of various plants. France must do this or have a miserable, starving peasantry such as Russia. The same is true in Germany and must be especially true in purely agricultural communities.

We must believe that the day will come with us when the fullest development of our resources, and especially the preservation of them, will demand more exact knowledge of the nature and needs of these resources. Hitherto, to repeat the common expression, our agricultural, forestry, and grazing operations have consisted largely in "skimming off the cream." We have profited by the richness of a virgin soil, by the abundance of a forest crop, ready for the harvest (though no man turned his hand in making the crop), and by the luxuriance of oceans of native grasses. But even now, the last of the "cream" is being consumed. Especially is this true in forestry, where more than half of our princely inheritance stands without promise of future forest, unless at the hands of the skilled forester, while, with ordinary rainfall, the great areas of Central Texas, of the Rio Grande country, of the Staked Plains and Panhandle, and of Trans-Pecos Texas often lie bare of grass; many choice native species are being exterminated and over miles of prairie where,

twenty years ago, one section produced grass enough for more than three hundred cows, now, a single animal must range from ten to twelve acres for a scant forage.

I seem to have made a strong statement in favor of technical training in agriculture, forestry, and agrostology. There is no question as to the desirability of these. But at least the facts emphasize the advantage of a more intimate knowledge of plant life for two reasons: first, because such a knowledge will incline public sentiment to encourage scientific methods in agriculture, forestry, and grass culture; and, second, because any rational (scientific) system of procedure in these fields demands an exact and intimate knowledge of plant life.

The study of Botany as understood and pursued today is the study of plant life. Under some circumstances it has meant as little as the study of flowers in order to appreciate better their beauty and to aid in cataloguing plants. In its broad application it includes whole special fields like bacteriology and forestry, where clearly its field overlaps the domain of chemistry and physics and zoölogy and geology. The study may be pursued for aesthetic purposes, or for the love of pure science, or for cultivating the mind in the course of training aimed at securing what we term "general culture," or for practical purposes, of which one would be preparation for teaching, another fruit raising or forestry or farming. Clearly, some phases are better pursued in technical schools, and there would be propriety in restricting the range of study in academic departments, because the aims of study there are toward general culture rather than toward utilitarian purposes.

The study of Botany as provided for by the University of Texas is indicated in the following series of courses as announced in the Catalogue:

1. *General Biology.*

In this course Botany co-operates with Zoölogy in opening a field of study designed primarily to be of value in a general education, but it is prerequisite as well as an introduction to the more advanced courses in Botany. The work begins with a study of living protoplasm as represented in the simplest organisms, or in individual cells of more complex organisms. The physiology of nutrition and growth and of reproduction in simple organisms is studied here.

The course then proceeds to the study of more highly differentiated organisms, and watches the gradually unfolding complexity in structure and function toward the higher types.

The laboratory work involves a study of the following groups of plants:

Representative species of the green algæ, of the blue-green slimes, the red and brown seaweeds, the bacteria and other fungi (especially those of economic importance like rusts, smuts, mildews, and mushrooms), the mosses and moss-like plants, the ferns and their allies, and, when time permits, representatives of the seed-bearing plants.

2. a. *Physiological Plant Anatomy.*

A detailed comparative study of plant structures, with special reference to their adaptation to function and environment. (*During the Fall Term.*)

b. *Plant Histology.*

This is a continuation of 2a, but special attention is devoted to practice in special methods of preparing plant tissues for microscopical study. It involves the use of fixing and preserving reagents, of differentiating stains, of the imbedding oven and the microtome for sectioning specimens. (*During the Winter Term.*)

c. *Embryology.*

The work of the spring term will be devoted to a study of the embryology of the seed-bearing plants. Students pursuing this work will be expected to become familiar with contributions upon plant embryology which appear in the various botanical journals.

Students who take course 2 will have already completed course 1 or its equivalent.

3. *General Morphology and Classification of Plants.*

a. During the fall term the study will be upon the Algæ and Fungi.

b. During the winter term the mosses and moss-like plants and the ferns and their allies will be the subjects of study.

The full year's work may be completed here by pursuing course 2c, the Embryology of Seed Plants, or course 4, on Economic Botany.

Course 3 is of special interest to us in Texas because so little

study has been given to the lower plants of this State. Students will be encouraged to secure collections of algæ and fungi, the mosses, etc., from every possible place in Texas. Teachers everywhere, and everyone interested in botany can be of great assistance in this enterprise.

4. *Economic Botany.* (*During the Spring Term.*)

Lectures and laboratory work upon the orders of plants of special value in medicine and in yielding food, timber, fibre, etc. This will involve, also, work in collecting and classifying flowering plants.

5. *Elementary Physiology, Ecology, and Plant Geography.*

This course will involve especially field work in a study of the flora about Austin, its relation to different soils and to moisture conditions, its adaptation to extreme heat and drought, its habits of flowering and the relation of flowers to insects in pollination.

This course is open to certain classes of students who have never studied botany, namely, special students, teachers, and Freshmen who choose to absolve the entrance requirement in science by offering Botany.

6. *Advanced Study of the Flora of Texas.*

This work can be pursued only by students who have already completed at least two years of botanical study in the University, or who have an equivalent standing in botany. The work is here focused upon the investigation of some one question, and students are expected to show their capacity for original work by the methods they pursue and the results they attain in following out a special line of study.

7. *Special Field Work in Botany.*

This work will offer advantages to advanced students whose subject requires much field work, and to students and teachers who cannot carry on the courses during the regular session. It will be projected along two lines:

a. *A Study of the Gulf Coast Flora and the Marine Flora of the Gulf.*

This will be carried on at Galveston where, at the earliest possible time, laboratory facilities will be furnished by the University.

b. *A Botanical Survey of the State.*

This will involve careful collection, preservation, and classification of species, a study of the laws of distribution, conditions of plant life in various zones and phenomena of adaptation. The work can be pursued to special advantage during the summer vacation and by parties fitted out to carry on work in camp.

In due time, more specific plans and announcements will be made concerning this work.

Let us now inquire how these courses of study in Botany may be expected to yield results of practical value to the State.

1. They may create an interest in the study of plants because, among other things, plants are shown to be identified with biological questions of profoundest human interest, and because their vital processes are essentially the same as in our own bodies, though manifested so differently. Such an interest will result in a more widespread knowledge of the structure, and vital needs of plants, and will, as previously stated, direct those industries which deal with the cultivation of plants along rational scientific lines.

2. They may be the means of training teachers who will be fitted to direct an efficient study of Botany in the high schools of the State. There can be little doubt that, since the chief resources of Texas, as already indicated, involve the exploitation of plants in agriculture, forestry, and grazing, and since the materials for study are so ready at hand and so agreeable to deal with, the study of Botany will become one of the fixed subjects of study in the schools of the State.

3. They may be the means of developing in advanced students a keen spirit of research and a method of investigation which will enable them to undertake and solve botanical questions of most vital importance to the State. These expert botanists would perform for agriculture and kindred interests a service exactly analogous to that performed by expert electricians and mechanical and civil engineers for the industrial arts. A good illustration of this is shown in the well organized work of the Department of Agriculture at Washington. It is gratifying, and not a little surprising at first, to note how generally well trained investigators are employed in the advancement of the nation's interest in agriculture, forestry and the like. Specialists are engaged in studying the nature and remedy of

plant diseases, in experiments to improve the quality, hardiness, and yield of fruits and cereals, in questions relating to forestry, the management of forests, the reforesting of denuded areas. There is a division of pure seed investigations, another for the study of poisonous plants, still another devoted to the study of forage grasses and the improvement of cattle ranges, and one to promote the introduction of valuable fibre, timber, food and medicinal plants for cultivation in suitable areas.

These are the adjuncts of a highly differentiated civilization, and it will be found that as she develops her resources more and more, Texas will follow the practice of older States in organizing departments of its State government for expert investigation and administration in those fields where her chief resources lie.

4. The study of Botany, involving as it does a study of climatic and other physical conditions which constitute the environmental factors of plant life, would naturally lead to a wise discrimination of areas where factors of soil, temperature, and moisture make the required natural conditions for some plants, although impossible for others. Such areas have come to be known as life zones. They can be recognized by a close study of the native plants and animals peculiar to them. The broad area of Texas presents good illustrations of such life zones. There is, for example, at the mouth of the Rio Grande, a strip of the tropical, where, with irrigation, conditions would be like those of southern Florida, and plants for cultivation could be the same. Again, there is a narrow zone on the Gulf coast where the immediate influence of the Gulf gives rise to conditions favorable to certain plants which cannot succeed in Central Texas. Sea-island cotton, rice, and sugar cane find their best conditions here, and, according to Chief Merriam, of the U. S. Biological Survey, "as a fruit belt, it has no competitor except certain areas in California and Arizona. Bitter oranges, loquats, granadillas, figs, and Japanese persimmons, among other fruits, thrive here."

Perhaps no more noticeable illustration could be found than that furnished in going from Central Texas northwest across the Staked Plains. To begin with, one finds himself in the warmer part of the cotton belt, where the fig can be cultivated. At the foot of the plains he passes out of the cotton belt and at 3500 to 4000 feet leaves the mesquite behind and enters a life zone which begins to be occupied by species of plants found on the plains of Western Ne-

braska and Kansas and Eastern Colorado. The sensation is that of being in a wholly different climate.

When Texas enters upon that stage of diversified agricultural and horticultural existence for which many are now hoping and working, the knowledge gained by the study of Botany, as just pointed out, will help to furnish that rational method of procedure which distinguishes highly organized agricultural communities.

5. Again, it may be reasonably expected that the study of Botany as contemplated in the University, will promote an intelligent interest in the planting of trees for street adornment, in beautifying the grounds of public institutions, in reclaiming vacant and unused city blocks for park purposes, and in laying out public parks and gardens as an essential feature of every municipality. It may not only create a desire for these things, but it may yield the sort of information which will give good direction in executing plans.

The list of shrubs and trees which might be successfully cultivated in a given locality could be very much extended if there were a broader acquaintance with species and a better knowledge of how to care for the rarer kinds. There is little skill shown, in most cases, in methods of planting trees and shrubs, with the consequence that stunted and unsymmetrical plants abound, and generally, too, there is no consistent plan carried out in landscape gardening whereby an artistic result is reached in the selection and grouping of trees and shrubbery for a given landscape. Results, however, are very likely to express the sentiment of the individual or the community upon such subjects.

In general, then, the study of Botany, as here contemplated, is of value in two main directions:

1. As a useful subject for attaining that general culture of mind which the trained student brings to bear upon his special work as a citizen.

2. As yielding the kind of knowledge and interest which can give intelligent direction to the development of the State's resources, and increase its standing as a highly organized and efficiently administered commonwealth.

ENGINEERING.

THOS. U. TAYLOR.

R. D. PARKER.

1. *Engineering Education in the South.*

As the Civil War had such a material effect upon the destinies of the South, and as it destroyed the old civilization where the cavalier had his impress upon our institutions and customs, it took time for our ideas and thoughts to crystalize under the new order. This period forms a necessary dividing line in discussing the needs of any kind of education of today. Before the war the center of engineering education was far to the North, and held there with a tenacity that was not disturbed by a few isolated efforts in some of our colleges. The Virginia Military Institute, from 1840, did much to draw this center nearer the Gulf, and the brilliant success of her graduates in engineering brought this "West Point" of the South much renown. To the Virginia Military Institute, about 1840, came Thomas Williamson, a West Pointer, a man who impressed his individuality upon his students, and who for twenty-five years delivered the only lectures on engineering that were delivered in the South. The whole course was almost an exact reproduction of the course at West Point in nearly all of its details—notably the case in engineering, in military science and its method of marking. That the work was well done in engineering is well attested by the conspicuous place taken by the Virginia Military Institute graduates in civil and military life. But the Virginia Military Institute was practically alone, in the South, in its efforts to train engineers.

There were many causes that retarded engineering, and, in fact, all industrial education in the South. But when the old civilization was destroyed, a newer life rose, and girded itself for a new duty. Engineering education in the South, with the exception of the Virginia Military Institute, is a *post bellum* plant. But as soon as the Southern universities had re-collected their faculties, many introduced engineering courses, although some of their courses were

simply adjuncts to the chairs of mathematics or physics, and received no more attention than secondary subjects generally do.

In 1868 the University of Virginia added to its already first-class schools the school of applied mathematics. The work was eventually expanded into a Department of Engineering, and now has a special building and is well equipped with modern apparatus.

Washington and Lee added Engineering courses upon its reorganization under the presidency of General Lee. Some of the very best engineering educators in America have directed its courses in engineering. Considering its equipment, it has done remarkable work.

Another institution that has done much to bring the center of engineering education further South is Vanderbilt University, and, if we include Missouri in the South, we can add two other institutions, Washington University, at St. Louis, and the State University, at Columbia—the former of which is one of the leading engineering schools on the American continent. If to this short list we add the University of Texas, at Austin, the list of universities that offer engineering courses will be nearly complete.

If we include several agricultural and mechanical colleges that have engineering courses we shall have a complete list of all the forces at work. Some of these have well developed and well conducted departments of engineering *per se,* while others restrict their efforts to instruction to general courses in mechanics. The A. & M. College of Mississippi, at Starkville, was organized in the early part of the eighties, and at once took rank as one of the very best industrial educators in the country. The Alabama Polytechnic, at Auburn, has long been doing excellent work in practical scientifie instruction. The Agricultural and Mechanical College of Texas was organized in 1871. It is well equipped in most of its departments, and its work is well done. When it can raise its entrance requirements, its efficiency will be largely increased. The University of Arkansas, a few years ago, changed from its principal courses, the old classic system, to those of a modern scientific nature. It added a full line of the necessary shops and laboratories. North Carolina within the last few years has organized a college, at Raleigh, for industrial education, and South Carolina is well provided for such work by Clemson College. In Virginia, the engineering work done in its A. & M. College, at Blacksburg, is well developed.

In addition to these State institutions, there are several other in-

stitutions that are rendering excellent service in the course of industrial training. The University of East Tennessee, at Knoxville, has made the most recent advancement in equipment and arrangement of courses. The Miller School, of Albemarle county, Va., has one of the best mechanical equipments in the South.

Then, summing up, we see that the vast belt of Gulf States, from Virginia to Texas, and those south of Ohio, is occupied by about half a dozen universities that offer engineering courses. To those who would be disposed to extend this list, I would say that I have purposely omitted those institutions that have a course in engineering attached as a rider to the chairs of mathematics or physics. I have mentioned those that seriously offer courses in engineering subjects.

The number of engineering schools is insignificant when considered in connection with the area covered and the resources of this region. Many of our Southern States have State universities with well equipped law departments, but few of them have a corresponding engineering department, nothwithstanding the fact that upon the engineer must always fall the responsibilities of developing the resources of the State or nation. We complain of having to ship our cotton to New England and buy it back in its fabricated state, but until the South takes the problem in its own hands by establishing engineering, industral and technical schools, we shall depend upon Northern mills to work up our raw materials, and upon Northern trained men to superintend our industrial enterprises. When Thomas Jefferson was having his long fight in establishing the University of Virginia, he urged upon the Legislature of the Old Dominion the necessity of higher education, and assigned as the principal reason for its creation the now self-evident truth that no State could hold its place unless it provided means for training the statesmen that practically make the State. It can be added with just as much truth that no country or State can keep its place in the commercial world that does not provide within its own borders means for developing its raw material, whether of mind or matter. Is it not more logical to spend the money of the commonwealth in training men to bridle the forces of nature, than to spend money in educating men in other fields, whose after efforts can be no more than the efforts of a private citizen? The profession of engineering in the South has been fed from every English-speaking country under

the sun, and the recruits, having fulfilled their special appointments, have left the land as dearth of resident engineers as it was before their advent. We must apply the same principles to our industrial enterprises that influenced Jefferson when he was working for higher education in Virginia. We must stop bringing our engineers from other climes, and we must depend upon ourselves for our own leaders. It is folly to rethresh the old dry straw about State's rights; to uphold the doctrine that the State is able to direct its own affairs and to control its own commercial destiny, and then follow this argument by a refusal to provide for the training of our young men in the engineering branches. I do not suppose any one will understand me to limit the term engineering to the ordinarily accepted meaning, which is usually restricted to civil engineering. I use it in its broadest sense, and in this sense it includes all industrial education; in fact, wherever mathematics is applied to utilize the forces of nature for man's benefit. It should commence in the city high school, if not in the lower grades, in the shape of manual training.

Almost every day we read in the papers about some bridge disaster, some water tank failure, or the collapse of some public building. Our own State is covered by a system of iron highway bridges, ten per cent. of which would not pass any board of expert bridge engineers that could be named. Right here is an argument of everyday life that ought to appeal to every county commissioner in the State. A bridge of a certain span is to be erected. The commissioners' court receives several bids, and generally accepts the lowest. The highway bridge companies are represented by drummers who "skin" the bridge, yes, even take off the flesh, and in some cases take our essential bones, and by so doing underbid other companies. Every drummer submits plans that he thinks will win, and these are often arranged to catch the eye. To such a demoralized condition has highway bridge lettings descended that some reputable bridge companies have withdrawn from that branch of the trade. County commissioners who are in other respects shrewd business men adopt methods in dealing with county bridges that do not obtain in other business affairs. In erecting public buildings a design by some well known architect is adopted, and after this bids are invited upon a specific structure. It would be just as reasonable to ask for bids to erect a court house 100 feet square, with a certain number of rooms, with no other specifications, as to ask for bids for a bridge to span

a certain creek. Again, it would be as reasonable to buy a horse because he was sixteen hands high and weighs 1000 pounds, as to buy a bridge of 100 feet span and sixteen feet in width. Let our commissioners have their bridges designed by competent bridge engineers, with a complete set of drawings, and after these are obtained, invite bids for the erection of this particular bridge, according to specifications, and under the supervision of the designer or of a good engineer. The ordinary bridge drummer or agent is about as capable of designing a good bridge as a saw-and-hammer carpenter is of designing our State Capitol, at Austin.

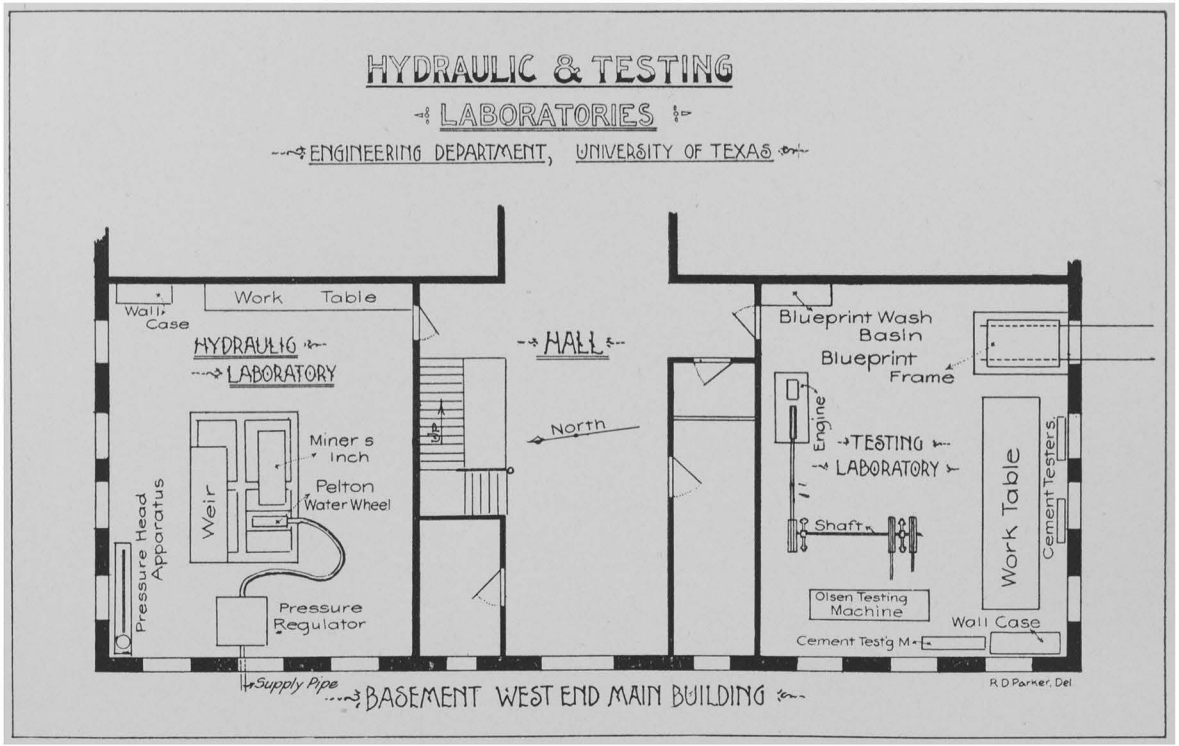
I claim that the State, as a matter of safety to itself, must offer higher education in law, and medicine, and engineering. When trained men go out from our law department, and when their influence is felt in the councils of the State, we will not witness two co-ordinate branches of our higher courts giving diametrically opposite decisions as to the validity of a common law marriage. When engineering and industrial education is placed on a footing of co-ordinate importance with law and medicine, and when students, in inspecting our catalogue, can see that we dignify that profession that must be the pioneer in all industrial enterprises, then the current of northern-bound engineering students will stop, and not before.

2. *Engineering in the University of Texas.*

In the year 1888 the Regents of the University elected an adjunct professor of applied mathematics. At this time the work was included in the school of mathematics, but in 1890 the school of applied mathematics was created as a distinct school. In 1895 the Regents created the Department of Engineering and assigned as the faculty of the department those professors and instructors whose courses are prescribed for the degrees in engineering The work is now done by the present

FACULTY.

WILLIAM LAMBDIN PRATHER, *President.*
THOMAS ULVAN TAYLOR, C. E., *Civil Engineering.*
FREDERICK W. SIMONDS, Ph. D., *Geology.*
HENRY WINSTON HARPER, M. D., *Chemistry.*
GEORGE BRUCE HALSTED, Ph. D., *Mathematics.*
WILLIAM TYLER MATHER, Ph. D., *Physics.*
MORGAN CALLAWAY, Ph. D., *English.*


HYDRAULIC & TESTING
LABORATORIES
ENGINEERING DEPARTMENT, UNIVERSITY OF TEXAS
Work Table
Wall Case
HYDRAULIC
LABORATORY
HALL
North
Miner's Inch
Pelton Water Wheel
Weir
Pressure Head Apparatus
Pressure Regulator
Supply Pipe
Blueprint Wash Basin
Blueprint Frame
Engine
TESTING
LABORATORY
Shaft
Work Table
Cement Testers
Olsen Testing Machine
Wall Case
Cement Test'g M.
BASEMENT WEST END MAIN BUILDING
R. D. Parker, Del

SYLVESTER PRIMER, Ph. D., *Teutonic Languages.*
LILIA M. CASIS, M. A., *Romance Languages.*
JAMES R. BAILEY, Ph. D., *Chemistry.*
LEONARD EUGENE DICKSON, Ph, D., *Mathematics.*
RICHARD DENNY PARKER, C. E., *Instructor in Civil Engineering.*
HARRY YANDELL BENEDICT, Ph. D., *Mathematics.*
EUGENE PAUL SCHOCH, C. E., M. A., *Chemistry.*

COURSES.

The following courses are offered. The figure opposite a course indicates the number of lecture hours that are occupied by it for every week. Three hours of laboratory, field, or drawing work are equivalent to one lecture hour. Unless otherwise stated, the course continues throughout the year. A full course occupies three hours a week throughout the session.

1. (One and one-third courses). 4.

(a) Highway Engineering; (b) Theory of the Use and Adjustment of Instruments; (c) Land Surveying and Leveling; (d) Descriptive Geometry; (e) Field Practice.

2. (One and two-thirds courses). 5.

(a) Linear Perspective and Axometric Projections; (b) Railway Location and Details of Construction; (c) Geodetic, Topographic, City, Hydrographic, and Mine Surveying; (d) Field Practice.

3. (Two and one-third courses). 7.

(a) Applied Mechanics; (b) Stresses in Roofs and Bridges; (c) Mechanics of Materials; (d) Design of Simple Structures; (e) Hydraulic Engineering; (f) Irrigation Engineering; (g) Field Practice, Laboratory Work; (h) Railway Maintenance and Track Work.

4. (Two and one-third courses). 7.

(a) Bridge Designing; (b) Foundation and Erection of Structures; (c) Stereotomy, Theory of Braced, Solid, Oblique, and Elastic Arch; (d) Materials of Engineering; (e) Stresses in Complex Structures; (f) Masonry Construction; (g) Sanitary Engineering; (h) Higher Geodesy; (i)

Water Supply Engineering; (j) River and Harbor Engineering; (k) Contracts and Specifications; (l) Class Thesis; (m) Field and Laboratory Practice.

Courses 1, 2, 3, and 4 correspond to what are usually known as Freshman, Sophomore, Junior, and Senior.

FIELD AND LABORATORY PRACTICE.

It is the policy of this department to emphasize the importance of actual practice in the field with all the different instruments used by engineers and to follow as closely as possible the methods employed in the best practice of the profession. This impresses the lessons of theory more forcibly in the student's mind than mere class work can possibly do, and is one of the features of American technical schools giving them prestige above like schools in foreign countries. In a recent lecture Prof. I. O. Baker, head of the Engineering Department of the University of Illinois, and author of several valuable texts on engineering subjects, said: "American engineering education is much superior to that of any European country. In England, properly speaking, there are no engineering colleges. Engineers receive their education through the apprenticeship system. In Germany, engineering education consists largely of undue refinement in mathematical and scientific analysis, with little or no attention to a study of economic conditions of engineering problems. The American method of instruction by means of laboratory and field practice is practically unknown in Europe." Failure to recognize this vital factor in the education of engineers is a serious drawback to an engineering school, and upon such instruction will depend largely the efficiency of the college and the success of its alumni in the practice.

In railroad engineering the classes in the University of Texas are taken through the field work in preliminary surveys and location. Full field notes are taken according to proper form as the work progresses. These are taken into the drawing room where railroad office work is done. This consists of the preparation of the map of line, preliminary and location, showing topography and property lines from transit maps and topographic notes; and complete profiles from level notes. In the latter instruction is given in laying grades, with compensation for curvature, hints as to economics of location; and

making of estimates, preliminary slope stakes having been set upon completion of location. Instruction as to work of construction, which follows, can only be given from texts and lectures, however, many of the students have obtained work in this line during the summer months before graduation, thus completing their practice in railroad work.

Complete adjustments of all field instruments are made. Practice in compass surveying is given; and a complete survey and map of some farm is made each year. Precise triangulation and topographic work, especially by stadia methods, is carried out with the transit; also practice with level in contour work, cross-sectioning in railroad work, and precise leveling, using sea level datum. Precise measurements of base lines is made with standardized tape (U. S. Department of Weights and Measures), taking into account the effect of temperature, sag and pull, according to the methods employed by the U. S. Coast and Geodetic Survey. River soundings are made and measurements of flow taken with current meters (electric and acoustic). The use of the plane table in topographic work is exemplified, and the use of the sextant in the field is explained. With the solar compass and transit, meridians and interpolated latitudes and longitudes are determined, constants being taken from Nautical Almanac.

In the testing laboratory, the following is an outline of the work. The standard tests of materials employed in construction of bridges, buildings and other public works are made as follows:

Cement.—Fineness, temperature, weight, color, and setting; 1, 7, and 28-day tensile tests of cement, neat and in various combinations with sand. Compressive and concrete tests.

Brick.—Compressive strength.

Timber.—Tensile and compressive tests with determination of coefficient of elasticity, elastic limit, ultimate strength and elongation, and bending.

Iron and Steel.—Tensile strength with determination of constants.

Hydraulic Experiments.—Flow over weirs of various forms, flow through orifices, ajutages, pressure tests, flow of streams, flow over weirs, through long and short pipes, test of water motors, rating of current water, tests of nozzles, etc., etc.

The engineering laboratory is one of the most complete in the South, and contains the following testing machines: One Olsen

testing machine of 100,000-pounds capacity, provided with deflection instruments, automatic recorder, torsion apparatus, duplex micrometer, measuring instruments, and compression micrometer; one Riehle Bros. testing machine of 10,000-pounds capacity; one 2000-pounds Olsen cement tester, provided with moulds for both tensile and compressive tests; one Riehle Bros. cement tester of 1000-pounds capacity; one Fairbanks automatic cement testing machine.

The collection of field and office instruments includes the following: Two Heller and Brightly transits, one of which is provided with Saegmueller solar attachment; three Gurley transits, one of which has the Gurley solar attachment; three Buff and Berger levels; three Gurley levels; five Gurley needle compasses; one solar compass; one pantograph; one planimeter; one sextant; one plane table; stadia, and leveling rods; chains, tapes, irregular curves and section liners. For running the testing machinery a four-horse power Otto gas engine is used; also for facilitating the calculation of stresses in bridge and other structural designs, a Thatcher's calculating machine is at all times accessible.

The hydraulic laboratory contains a pressure regulator 20″x40″, provided with governing valves and manometers to insure constant head, and with brass orifices of various forms for testing the coefficients of discharge and velocity; a tank provided with a Church Hook Guage and with ajutages and pipes for testing the flow for different lengths; a weir tank 4′x9′x2′, provided with baffle boards and the different forms of adjustable notches; one 12-inch Pelton water wheel, provided with Prony brake; platform scales; house water meters; galvanized iron tanks; various nozzles; a stop watch; and, for field work, one Price Acoustic Meter, and one Price Electric Meter, designed by U. S. Geological Survey, and sounding appliances.

The following partial list of graduates and ex-students from this Department shows the practical character and value of the work given:

W. H. P. Hunnicutt, '88, Draughtsman, Land Office.
Jas. C. Nagle, '89, Professor of Civil Engineering A. & M. College.
D. W. Spence, '89, Asst. Professor of Civil Engineering A. & M. College.
T. J. Lyne, '91, Roadmaster S. P. Railroad, Louisiana.
H. B. Jones, '91, Civil Engineer, Amarillo, Texas.
R. A. Thompson, '92, Expert Engineer Railroad Commission of Texas.
Geo. A. Endress, '92, Engineer "P. G. Railroad," Lake Charles, La.
S. S. Posey, '92, Engineer Steel Co., Youngstown, Ohio.

H. Y. Benedict, '92, Instructor Mathematics, University of Texas.
E. P. Schoch, '94, Instructor Chemistry, University of Texas.
U. S. Ellingson, '94, Engineer, M., K. & T. Extension.
Fritz Reichman, '96, Fellow University of Chicago.
W. A. Spalding, '96, Engineer Frisco Railroad, Arkansas City.
H. O. Neville, '97, Chief Engineer to Gloria Land Co., Cuba.
J. C. McVea, '97, Electric Light Superintendent, Flatonia.
John Spence, '97, U. S. Geological Survey.
R. D. Parker, '98, Instructor Civil Engineering, University of Texas.
O. A. Pfeiffer, '98, Engineer C. & M. R. R., Indian Territory.
C. M. Campbell, Irrigation Engineer, East Texas.
Oren Bunsen, Civil Engineer, Mexico.
B. M. Haberer, Engineer Cane Belt R. R.
A. C. Stiles, Topographer, U. S. Geological Survey.

THE UNIVERSITY.

THE WORK OF THE YEAR IN THE DEPARTMENT OF LITERATURE, SCIENCE, AND ARTS.

The School of Botany.

This session completes the third year in which courses in Botany have been offered in the University, but the School of Botany celebrates only its first anniversary with the close of this college year. Previous to this year, the study of Botany was a part of the work carried on in what was the School of Biology. When the School of Botany was organized, the late Prof. Norman chose the name *School of Animal Biology* to designate the zoological work. The name subsequently adopted was *School of Zoology.*

The School of Botany occupies a portion of the third floor in the east wing of the main building. It occupies the lecture room in common with Zoology, as well as the large laboratory on the northeast where the two schools unite in conducting the introductory course known as General Biology. The location, lighting, and convenience of the new quarters are well adapted for biological work, and when the equipment and furnishing now under way are completed, these laboratories will be equal to those of other State universities. As a matter of fact, however, these quarters can be regarded as merely temporary for both Zoology and Botany, for in the natural course of development of two schools having such a field of work as that offered by Texas, they will need to be housed in buildings erected with special reference to the work to be carried on.

As stated in a prospectus of the school two years ago, the special trend of the development of Botany in the University and in Texas, is in the direction of a study of the rich and varied flora of the State. The plan is to get the largest constituency possible engaged in this work, both in the University and by organizing botanical study in secondary schools. In this last direction a point has been gained in that henceforth Botany may be offered in fulfilling the new entrance requirement in science for admission to the University. It is hoped this will encourage the study of Botany along with other natural sciences in the preparatory schools.

In prosecuting the study of Texas flora, it is the intention also to carry on investigations in connection with large economic interests, such as forest preservation and management, the treatment of grazing lands with reference to preserving native grasses, and the marking out of culture areas for many desirable species whose cultivation would be profitable and generally advantageous. Something has already been accomplished in several directions:

First. Investigations have been in progress in connection with forestry matters, whose published results are expected to assist in organizing a definite forestry management by the State.

Second. The Biological aspects and zonal distribution of the vegetation of the arid regions of Texas forms the subject of investigations extending over a period of three years. The results of this study will be published with copious illustrations.

Third. A very excellent beginning has been made in the study of the Fungi of Texas. This is the subject of a thesis by one of the graduate students in Botany.

Perhaps no portion of the Texas flora offers so new and tempting a field of study as the Fungi.

Two other graduate students have presented theses representing special study of important members of the Texas flora.

Beside the Fungi, there is an open field for the study of others of the lower groups of plants which have hitherto escaped attention in this field. It is planned to take up such studies as soon as properly trained students can be set at it.

W. L. B.

* * *

The School of Chemistry.

The session closes upon a very active and prosperous year in the history of the School of Chemistry. The attendance has been larger than during any previous session, and the consequent demands upon the teaching force and the laboratory equipment created a high-tension stress throughout the year. Every exigency was promptly met, the work was done without friction, and some important results have been obtained; all this was accomplished by systematized, concentrated, and continuous effort, and at the expense of more nerve energy than can be reasonably expected of so small a teaching force.

Inasmuch as the enrollment and many other important facts concerning the year's work are included in the report of the School of Chemistry annually made to the President, and as that report is usually published at this season of the year, the subject matter of this note must necessarily be severely circumscribed, and for further details the reader is referred to the aforesaid report.

Earnest work has been done by the students in all the courses given; and in some classes important results have been obtained. In the prosecution of Chemistry 5 and 9 a number of new compounds have been discovered, and in Chemistry 3, 4, and 7 a considerable amount of technical work for citizens in various parts of Texas has been done. Dr. Bailey and his pupils have made substantial progress along special lines of organic chemical research; and the same is true concerning special lines of inorganic chemical research under other supervision. Some of the results will soon be published. This work demands substantial encouragement at the hands of the people of Texas—which means that the help in the School should be adequate to more than meet the actual teaching needs in order that more time

may be devoted to research. The work done here is done under too much pressure.

Among the contributions of the session special mention should be made of these:

1. An Economical Method for the Production of Ammonium Ichthyosulphonate, by Mr. A. C. McLaughlin, B. S. The method was successfully worked out in this laboratory, and applications for patents on the process are now pending in the United States and Mexico.

2. Some Texas Petroleums. Further investigation is still pending in this laboratory. A preliminary paper is to be read at the New York meeting of the American Association for the Advancement of Science, June, 1900.

3. The Action of Diazonium Salts on Hydrazo and Anilido Acids, by Mr. Louis Knox.

4. Action of Ethylene Oxide on Semicarbazide-propionic Acid, by Mr. L. H. Kirk.

The following theses represent an actual addition to chemical knowledge:

1. The Soils of Texas, with Special Reference to Certain Soils in the Vicinity of Austin, submitted for the degree of Master of Science, by Miss Hattie V. Whitten. This thesis belongs to the School of Geology and its supervision should be credited to Dr. F. W. Simonds. However, some very important chemical work which was done and supervised in this School appears therein.

2. On Ring Formations in Organic Compounds, submitted for the degree of Master of Science, by Mr. Chas. P. Norby.

3. Action of Phenyl Mustard Oil on Anilido-propionic Acid and Phenylhydrazo-propionic Acid, submitted for the degree of Bachelor of Science, by Mr. O. H. Palm.

An article on the synthetic preparation of certain triazols, embracing the discovery of about forty-five new chemical substances, representing part of the work done in this laboratory by Dr. J. R. Bailey and Mr. S. F. Acree, appeared on the first May program of the German Chemical Society, and was published in the journal of said society (Berichte der deutschen chemischen Gesellschaft).

Incident to the year's progress it is pleasant to note the promotion of Dr. Jas. R. Bailey to be Adjunct Professor in this School; the selection of Mr. E. P. Schoch, C. E., M. A., Instructor in Chemistry, for the task of revising the text-book on Chemistry to be used by the schools affiliated with the University of Chicago; the advancement of Mr. S. F. Acree, B. S., M. S., of this University, to the Senior Fellowship in Chemistry in the University of Chicago; and the promotion of Mr. J. C. Treadwell to a very responsible position with the Mexican Ore Company. Mr. Treadwell received his chemical training here. Mr. O. H. Palm has creditably filled the position of Fellow in this School.

The equipment has been augmented by some important new apparatus, and the following prized additions to the chemical library: Liebig's Annalen (complete set), the last volume of Beilstein's Organische Chemie, and

Richter's Lexikon der Kohlenstoff-Verbindungen. Increased equipment and augmented teaching force still remain a pressing need of the School.

Mr. Schoch's leave of absence having terminated he returns to his position here, and will also have charge of the Chemistry given in the Summer School, in which he is to be assisted by Mr. Alfred Freshney.

Dr. Bailey has been granted a year's leave of absence. He goes to Ostwald's laboratory, Leipzig.

H. W. H.

The School of English.

The ideal which the English School has continually kept before it has been that of a closely articulated and logically coördinated body of work which, in view of its aim, its method and its achievement might properly be called scientific. The School was, therefore, organized on principles somewhat different from those which underlie the organization of similar schools in other universities. In its early stages the new plan had to be fitted to the previous English work of the University in such a way as to produce as little disturbance as possible. Only during this past year has the School been able to carry out the plan of courses as originally drafted; during the previous two years its efforts were mainly directed toward establishing the elementary courses in such manner that they would prepare a scientific foundation for the advanced work of the School. Chief attention was, therefore, given to English 1. This course was formulated in such a way that it would not only offer opportunity for the practice of English writing, but would also furnish a scientific basis for subsequent work, either in language or in literature. The two parts of the course, Grammar and Composition, were made complementary to one another in the belief that a scientific knowledge of the development of English speech not only enables the student to cover a wider range in his study of English Literature and to prepare himself for the thorough study of the English language, but also gives him that intelligent and intimate knowledge of English idiom which is so necessary to the clear and forcible expression of English thought. It was on this belief that the School founded its justification for its departure from traditional methods of elementary English teaching—a belief which has itself been justified by the experience of the last two years. The fact that the course has been recognized to be no longer an experiment has materially contributed to its efficiency during the session just closing, for the students have in a measure realized the practical relations which it bears to their subsequent study. During the first year the difficulty of the Old English work made it seem to the students that the course was one in philology, and had, therefore, little relation to the practical study of their native speech. During the past session, however, they have come to see that the difficulty is only that which attends thorough elementary study in any field of science and have recognized that the first term's study of Old English is only a preliminary to the real work of the course, namely, a clear understanding of New English idiom in the light of its historical

development. The School has thus, during the work of the past session, owed much to the intelligent coöperation and enthusiasm of the first-year students, and takes this opportunity to express its sense of obligation to them.

With this elementary course possessing a threefold aspect looking toward Literature, toward Philology, and toward Composition as the basis of the School's work it will ultimately be possible, as it has not been possible during the past year, to permit the student in his subsequent study to specialize along these three lines. That is the aim of the more elastic Sophomore requirement as provided in the outline of courses for next year. Those whose interest in the subject has been awakened by the first year's work can continue the study of Historical Grammar (English 4) while its fundamental principles are fresh in their minds, reverting to the general course in literature (English 2) for the Junior year's work. Those who are conscious of a deficiency of skill in English Composition can continue the study of that subject for another year, completing their study of English with the course in Literature (English 2) taken in the third year. Those whose inclinations are literary rather than linguistic can go on with English 2 for the second year's course, and specialize in the study of literature during the third and fourth years of their study.

As to the advanced work in English Literature, little need be said. The classes have been larger than during the previous year and their work has been earnest and enthusiastic. The Shakspere course, English 3, has been especially gratifying to the instructors. The first term was conducted as a lecture course on the life of Shakspere; the second and third terms were devoted to the careful study of *Romeo and Juliet* and of *Othello* in the light of modern scholarship in Elizabethan English.

The changing of English 10 from a course in English Criticism to one in the Science of English Literature made it possible to elaborate more thoroughly the scientific principles which underlie the development of English Literature. But the time allotted to the course was all too short for the sort of a treatment of these principles which the instructor would have liked to give. The field is new and one of great interest and importance—as interesting and important as that of Economics or of Ethics, and it is to be hoped that the time will come when American universities will recognize it as such.

The philological work of the School is based upon the general course in Elementary Historical English Grammar (English 1a of the Catalogue), which has been required of all Freshmen for the past two years. During these two years of transition from the former plan to the new one, a course (English 4) in the main parallel to this grammar work has been given in order to accommodate the advanced students who had not an opportunity to take the Historical Grammar in their Freshman year. Hereafter, however, English 4 will take up the work where English 1a leaves off; in a word, it will be a second-year course in the English Language. Besides these general courses, more special courses are offered in Old and in Middle

English. For next year a course is offered in the Old English Dialects. By the courtesy of Dr. Primer, the course in Gothic has for the past two years been given by the professor of English Philology.

The growth of the University during the past year has been very perceptibly felt in the English School, not only as a growth in numbers, but also as a development in a vigorous intellectual life. A change has been noticeable, too, in the increased numbers attending the upper classes, and it is a change which argues well for the future of the institution. It is not possible to accomplish the best results in English study when promising students leave the University at the end of their first or their second session, especially when preparatory instruction in English is as vague and aimless as it now is in our American educational system.

M. H. L.

* * *

The School of Geology.

The courses of instruction in the School of Geology during the present year covered a wider range than ever before. Physiography, constituting the work of the fall term in the first course—Elementary Geology—may now be taken by any who desire it, and when completed in a satisfactory manner credit for one-third of a course in science will be allowed. This subject is also taught in the University Summer School and hereafter will be offered as one of the new entrance requirements. The remaining two-thirds of course 1 are devoted to Elementary Petrology, Dynamic and Structural Geology with, at the close, a brief résumé of the history of the earth. The instruction is largely by means of lectures and quizzes with laboratory study of rocks and minerals.

During the year, as is customary, special excursions were organized, attendance upon which was voluntary. The most attractive was that to Granite Mountain and Marble Falls. At the former locality may be seen the great granite quarries from which were taken the blocks used in the construction of the State Capitol and the Colorado Dam at Austin, and at the latter the natural dam of the Colorado and the upper entrance to the cañon of that river. Other excursions were made in the vicinity of the University. On one occasion a large party was taken to Mt. Bonnell in order to study the stratigraphy of that region and the occurrence of celestite deposits. At another time the valley of Shoal Creek was explored and the faulting of rocks studied. For this course sixty students registered, not counting those who pursued Physiography in the University last summer.

Course 1 is supplemented by Historical Geology, known as Course 2, instruction in which is given during the spring term. For several years Le Conte's Elements of Geology has been used as a text-book, to which has been added the oral instruction of the professor in charge.

Course 3 will hereafter be designated as "Paleontology and Paleontological Drawing." During the fall term students are acquainted with the leading features of the animal kingdom as shown in their *hard* parts, *i. e.*, skeletons. Later some special forms of fossils are studied as, for example, the "Lamellibranchs of the Texas Cretaceous." Their names are determ-

ined, their positions worked out, and a careful exposition of methods of representation made. The student is taught to *draw*—not merely to copy, but to draw from the actual specimen. The object is not only to foster the spirit of close and accurate observation, but to teach him how to record the characters observed. Students in this course are expected to bring together collections of their own, and it may here be remarked that the Cretaneous rocks of Austin and vicinity afford most excellent opportunities in this direction.

Course 4 is devoted to Mineralogy. At first the physical properties of minerals are studied and later their characters as shown before the blowpipe. Once a week the class meets for instruction in crystallography, which is taught by the use of models, both of glass and wood, and diagrams. In this connection it may be stated that the School of Geology possesses a valuable collection of natural crystals illustrating the six recognized systems. The laboratory instruction is very practical, and the course is of great value to those preparing themselves for work in the applied sciences.

Economic Geology and Ore Deposits, Courses 5 and 6, represent the applied side of Geology. They deal with the occurrence of valuable deposits, both metallic and non-metallic. Economic Geology treats of the subject in a general manner, while "ore deposits," as its name implies, has to do with the metallic ores, and is a special or particular phase of Economic Geology. The course of instruction is based upon recognized text-books and when desired reference to original sources can usually be made as the School already possesses a library of fair proportions. The character of the work in these courses is such as to be of special value to chemical and engineering students, as well as to those who are preparing for professional work in Geology.

Petrography—the study of rocks—known as Course 7, has heretofore been reckoned as a one-third course. Next year it will be extended to a full course, and the microscopic study of rocks inaugurated. Suitable microscopes have been ordered in Germany and the School is already supplied with numerous carefully prepared rock sections. When this is done the general work in Geology will have been symmetrically developed, and carried as far as possible with the present force of instructors. It is sincerely hoped that at a day not far distant, Mineralogy and Petrography may be placed in the hands of a specialist who may devote his time and energy to the development of these branches.

Under Course 8 are included many topics of a special nature, depending upon the tastes and needs of students, especially graduates. This year one student made a careful study of the Geology of certain parts of Texas; two students have pursued advanced Historical Geology based upon Dana's Manual, and several have engaged in petrographic study other than that included in Course 7. In former years there have been taught as a part of this course such subjects as "Building Stones—their character and distribution."

The work of the advanced students has been, during this session, most

creditable. Some of the drawings made by the students in Course 3—Paleontology—have received well merited praise. A graduate, in conjunction with the School of Chemistry, has conducted an original investigation upon the nature and composition of certain soils found near Austin, which have been embodied in a thesis for the Master's Degree in Science.

In addition to the excursions with the general students, expeditions have been undertaken with advanced classes. The region adjacent to the mouth of Little Walnut Creek, east of Austin, was visited for the purpose of examining the Ponderosa marls *in situ;* the region of Mt. Bonnell for collecting samples of soils, and the Granite Mountain area for studying the occurrence of rare minerals.

The equipment of the School of Geology has been increased by the purchase, conjointly with the School of Pedagogy, of an electric lantern, and a Jones' Relief Model of the Earth. Orders are now out for a large Relief Map of the United States, by Howell, of Washington, and for two Seibert Petrographic Microscopes of improved pattern. Five commodious cases for the storage of specimens have also been added to the laboratory. Mention ought also to be made of the beautiful collection of shells presented to the University by Mr. Henry G. Askew, of Tyler, Texas, which has now been installed. This, with the Singley collection, presented by Mr. Geo. W. Brackenridge, gives us the largest and best conchological collection in the South.

Since the discontinuance of the Geological Survey (Dumble Survey) there has been a constant and increasing demand upon the part of the public for information concerning the resources—especially the mineral resources—of the State, in consequence of which the Professor of Geology and the Professor of Chemistry have repeatedly been called upon to give information or make examinations which should have been provided for by the State. This they have done as far as possible with the limited time at their disposal. They recognize that a limit will soon be reached—indeed, in some instances it has already been reached—when the questions submitted will require more time for solution than can possibly be allowed from the regular University work, and when the expense of securing apparatus will be too great. It is hoped that this serious defect on the part of the State may be soon remedied by legislative action and that a suitable bureau may be established at the University where not only information may be given, but investigations conducted looking to the development and welfare of the State.

F. W. S.

* * *

The School of Greek.

The work of the School of Greek during the present year has been encouraging. For the first time the School counts over a hundred students. Interest has been constant. Substantial progress has been made. Of this no small part is due to the very efficient work of the Instructor in Latin and Greek, Dr. D. A. Penick, a B. A. and M. A. of the University of Texas and a Ph. D. of Johns-Hopkins.

Courses A and B, taking the place of the old A, begin the study of the language. A volume of easy stories is the first text read. Two books of the Anabasis follow. In Course 1 the reading centers round the closing years of the Peloponnesian War, as seen in the pages of Xenophon, Lysias, and Plato. In Course 2, a foundation having now been laid in a sound knowledge of Attic, Homer is begun and read for two terms, followed in the third term by Herodotus. Courses 3 and 4 alternate, Course 3 tracing the development of poetry after Homer, Course 4 that of prose after Herodotus.

The Beginners' Class may be recognized as a permanent feature of the work. For years it was hoped that this class might eventually be discontinued, but the trend of educational thought points to the offering of beginners' work in Greek even in institutions of the highest rank. The case is similar to that of the modern languages. Higher institutions everywhere have long offered beginners' courses in these languages because many students are unable to secure proper preparatory instruction. In Texas this reasoning is even more applicable to Greek than to the modern languages, for Greek is taught in only five of our high schools. Nevertheless, Greek is properly a high school study, and the University encourages its introduction into the high school curriculum. It is one of the entrance requirements for the B. A. degree, and if studied in the high school relieves the student of an entrance condition. If he goes beyond our entrance requirements he secures advanced standing.

The ideals of classical study have changed greatly in the past few decades. The progress of investigation along all lines, more particularly in archæology, due to the magnificent discoveries made in the unearthing of Halicarnassus, Troy, Olympia, Pergamum and scores of other places, has transferred the study of Greek from the language to the people. The aim of the modern study of Greek is the reproduction of Greek civilization. In this the first and most important elements are, of course, language and literature, and on these are spent the greater portion of the student's time and energy. The ability to read understandingly and appreciatively is the object, but it is recognized that this can not be attained without accurate knowledge of forms and syntax and that slipshod methods do not produce that orderly habit of mind which is perhaps the most precious result of education. Translation is necessary as a test of understanding, but still more as a drill in clearness of expression and in the right use of English. The writing of Greek is regarded not as an end in itself, but as the best of all means towards mastery of the language.

Next to language and literature in the reproduction of a past civilization comes the study of its history, its private and public life, its religion, its art. All these form a part, though a small part, of the courses heretofore given. The time is too short and our facilities, in the way of books, casts, pictures, and models, are sadly limited. The School possesses, however, a good set of maps, five superb casts of statuary, and ten fine carbon photographs, chiefly of Athenian architectural monuments. Besides these

are a number of lantern slides, donated by Dr. W. T. Mather, and upwards of two hundred more are now being made by one of the best Eastern photographers. In these the school has an excellent beginning of an adequate series of illustrations for a systematic course of lectures on Greek sculpture.

It is a pleasure to note the success abroad of former students of the School. Donald Cameron, M. A., '96, and Carl C. Rice, M. A., '99, have both just been awarded scholarships in classice at Harvard, in recognition of their first year's work there as graduate students.

W. J. B.

* * *

The School of History.

The work in the School of History has expanded greatly during the year. The total enrollment has reached 355, which is a gain of seventy-one, or just twenty-five per cent over last session. The increase has been mainly in Courses 1 (Ancient History), 2 (Mediæval History), and 5 (American History). The attendance in Course 5 has somewhat more than doubled.

The general plan of the work has been to give one full course in Ancient, one in Mediæval, and one in Modern History, which three taken together would meet the general culture requirements of the average undergraduate. To these have been added more highly specialized courses in English (4) and in American History (5), and a graduate course (6), intended especially to give training in historical investigation and to develop the productive ability of students inclined that way. These three courses have been taken, with a few exceptions, by Seniors and Graduates.

In Course 6 the work of the class has been on the Texas Revolution. Each of the students taking the course has had some special subject more or less directly connected with the general subject to investigate, and the result has been much clearer light on some of the most important points in Southwestern history. Mr. Barker's subject has been *The Unification of Public Sentiment for the Texas Revolution;* Mr. Borden's, *The McMullen and McGloin Grant;* Miss Rowe's, *The Trouble at Anahuac in 1832;* Mr. Turner's, *The Mejia Expedition;* Miss West's, *Social Life in Early Anglo-American Texas;* and Mr. Winkler's, *The Cherokee Indians of Texas.* The principal materials that have been used are the small collection relative to Texas in the University library; the much more extensive collection in the State library; the archives in the Department of State; the Nacogdoches archives in the State library; a few papers from the Bexar archives; and the Austin papers belonging to Col. Guy M. Bryan, which have been made available by his courtesy. The common remark in the class, relative to questions which the materials used left unsettled, that the Bexar archives would tell, has passed finally into a standing joke; but this collection has just been transferred to the vault of the University and will soon be put to the proof of its value. There is every reason to believe it exceedingly rich.

Mr. W. F. McCaleb, who took M. A. in 1897, with History as his major,

and has since been holding a fellowship in the University of Chicago, has recently taken Ph. D. from that institution. He is now at his home in Carrizo Springs working on a monograph relative to the Burr Expedition. Mr. W. R. Smith who took M. A. in 1898, with History as his major, and was appointed to a University fellowship at Columbia has been there since and will probably remain another year. He has recently passed his examination for the degree of Ph. D.—with distinguished credit, one of his professors writes—and has now only to complete his thesis, which is on the Colonial History of South Carolina.

G. P. G.

* * *

The School of Latin.

I have been asked to say a few words through the RECORD about the work of the School of Latin. It affords me a particular pleasure to do this, because it seems a way of speaking again to the Latin pupils I had here in the session of '92-'93, when I was temporary supply.

The question of numbers is not the most important one in my mind, but it seems worth calling the attention of the alumni to the growth, if it be a growth, in the Latin department in the seven years past. The Freshman Class, which had about twenty-five members then, so far as my memory now recalls, has now grown to a class of some sixty or more, and must be taught in two sections. The Sophomore Latin, which had risen to about thirty members of late years, is this year about twenty, very near the old figures. The fear of the clean-sweeping new broom must have been at work here. Seven years ago there was a Junior Class of fifteen members, which stands out now in my memory as one of the best classes I ever taught. This year only ten students have enrolled for the same course, and ten is more than twice as many as the records for two or three years past show. Against my three Seniors in '92-'93, I have now only one to report. The present small number has been the usual one for a few years past.

A theory to account for the condition of the upper classes can at best be but partial. Freshman Latin owes its numbers to the requirement of one year of Latin for the B. A., and one year of Latin or Greek for the B. Lit. degrees. Above the Freshman, the Latin classes have come into absolute competition with any and every other subject. The choice of these subjects has rested, with a very few exceptions, entirely with the individual student, and Latin is necessarily a hard subject, nor has it the glamor of practical utility. Considerations of practical utility and pleas for the modernness of laboratory subjects have been very much in evidence of late. In the lapse of time, say fifty years from now, some of our old students will be able to give us interesting opinions about the comparative value of forgotten sciences and forgotten languages, all equally ancient then. Such a student, being grown wise, will know that the mental exercise was the chief thing, and Latin will have nothing to fear for its contribution to mental gymnastics.

The work of the classes has gone on along the usual lines. The Freshman Class has read a part of Cicero's Verrine Oration, and along with it worked out a part of the history of classical sculpture; Cicero has also supplied them with some of the imperishable stories of Roman wit, uprightness, and patriotism. Vergil we drew upon for the Sack of Troy, the Tragedy of Queen Dido, and the Descent into Hades. There was metre and syntax in plenty, but we made time for a synopsis (in English) of the entire Aeneid, and a brief survey, from a handbook, of Roman literature. There were exercises and grammar, too, for these are good to train the understanding.

The Sophomore Class had their grammar and exercises also, and read, in the field of history, Livy and Sallust; in the field of poetry, the throbbing lyrics of Catullus and the Odes of Horace, that matchless literary workman. In all of this work Dr. Penick has been an active and helpful part.

The advanced classes had a glimpse of the theology of the Stoics and Epicureans in Cicero's *De Natura Deorum;* they saw the world with the wise eyes of Horace, from his Satires and Epistles; and saw another world in the Attic New Comedy of Plautus. Some syntax and some metre they studied, and a few of them elected to see how Cæsar wrote Latin and follow him a long way after.

This to the alumni whom I know with a word of greeting, and a word to tell them that their old-time earnestness and consideration have descended to their successors.

E. W. F.

* * *

The School of Pure Mathematics.

This year has been a bloom period for the School of Pure Mathematics. In addition to the aid rendered by Mr. T. M. Putnam, of California, Professor Halsted has had the extraordinarily able support of two of his own former students, Dr. Dickson and Dr. Benedict.

For sixteen years, beginning with 1884, Dr. Halsted has given the work of the School a decidedly *geometric* character, believing that this, in its various ramifications, is the most remunerative, as it is the most charming part of all mathematics. But this year, in addition to the courses in Modern Synthetic Geometry, and in Recent Geometry of the Triangle and Circle (the Lemoine-Brocard Geometry), and in Geometry of Position (Projective Geometry), and in Non-Euclidean Geometry, the School has been strengthened and diversified by a course in Group Theory by Dr. Dickson and courses in Mathematical Astronomy by Dr. Benedict.

Dr. Benedict has in preparation a work on Orbit Theory; and Dr. Dickson has become such an authority on Groups, that the University of Chicago has offered him an Assistant Professorship in which his advanced work is to be in that subject. His name already appears in the program of the Department of Mathematics and Astronomy for 1900-1901. It is a source of great gratification to his former teacher and subsequent colleague here, that, while the University of Chicago emphasizes by special mention

under Modern Mathematics, "synthetic geometry," and under Introduction to the Higher Mathematics, "projective geometry," yet with the advent of Dr. Dickson appears in its program the magic name "non-euclidean geometrics." Course 50 is "Continuous Groups—Lie's theory with its applications to geometry, invariant theory, differential equations, systems of complex numbers, and non-euclidean geometrics."

To this latter application of Lie's theory Dr. Halsted devoted a considerable part of his "Report on Progress in Non-Euclidean Geometry" to the American Association for the Advancement of Science.

Some idea of the growing and widespread interest in this modern development of science may be gained from the following extract taken from a circular written and circulated by Professor Wm. W. Payne, editor of "Popular Astronomy":

"GOODSELL OBSERVATORY OF CARLETON COLLEGE,
"NORTHFIELD, MINN.

"THE NON-EUCLIDEAN GEOMETRY.

"To the Teacher of Geometry:

"Teachers of Elementary Geometry everywhere will be interested in the recent studies of the scholars in Pure Mathematics, at home and abroad, who have been investigating the claims of *Non-Euclidean Geometry.*

"Large attention was given to this topic at the last meeting of the American Association for the Advancement of Science, at which Professor George Bruce Halsted, of the University of Texas, made a full report on this important theme.

"Professor Halsted has consented to rewrite that scholarly paper in condensed form and plain language, especially for the benefit of *Teachers of Geometry in High School, Academy and College,* who want to know the latest views of eminent scholars of Mathematics in regard to the Non-Euclidean Geometry.

"This knowledge will be a help to any one in teaching the elements of Geometry in any school."

Our loss in Dr. Dickson is Chicago's gain. Two young men of the same sort of promise, F. H. Smith and R. L. Moore, are this year showing that the splendid quality of Texas youth is of undiminished vigor, and as the School of Pure Mathematics has supplied the faculty of Yale and Chicago, so may it in the future be ready to give of its young vitality to Harvard and Princeton.

G. B. H.

* * *

The School of Oratory.

The aim of the School of Oratory is to help the student to that command of his powers as thinker, writer, and speaker which is necessary for natural and effective public speech. The means to this end is training in the oral interpretation of oratorical literature; in the writing and delivery of speeches, addresses and orations; and in the preparation of assigned topics for practice in debates, discussions and extemporaneous speaking. As the aim of the

work is to afford, with training in the various forms of public speaking, special preparation for the duties of citizenship, the subjects treated refer largely to Texas and American history, and to questions of social reform and economic interest.

The public nowadays generally demand that a speaker shall not only have something to say, but that he shall say it without bombast or ranting, simply, directly, naturally, and as briefly and concisely as clearness will allow. Barring the more formal occasions, the average man today has not the time or patience to listen to a long speech unless the speaker has a real message and is specially qualified to deliver it.

The work of the year is on the whole satisfactory. The interest and work of the students furnish ground for encouragement and hope for the future. The literary societies are a powerful aid in supplementing class instruction. The existence of two men's literary societies furnishes a rivalry which is helpful, alike to them and to this School. So far the young ladies have no rival to the Ashbel, but I trust steps will soon be taken to provide one.

Encouraging as the work of the year is, there is room for improvement along many lines. To secure satisfactory results more time should be allotted students from the Department of Law, and credit allowed for the work in this School. Again, much depends on the general interest of the Faculty and student body in leading the students to give the matter of public speaking individual attention, and to set for themselves higher and higher standards of excellence. In this regard, much is yet to be accomplished. However, the prize contest in public speaking, made possible by the generosity of Hon. A. P. Wooldridge, the winning of the Baylor debate, and the high standing earned by our representative in the oratorical contest in South Carolina, evince an increased interest and have given an impetus to this branch of student activity. In this connection, while I do not conceive it to be the function of this School to plan its work with reference to public exhibitions, yet I do earnestly call the attention of friends of the University to the need of securing funds for the establishment of at least two annual prizes within the University, to-wit, an annual prize in oratory and an annual prize for an inter-society debate. One or both contests for these might be made features of commencement week, and the donors of prizes for such contests, as is the case at many other institutions, would earn the perennial gratitude of students and alumni of this University.

E. D. S.

* * *

The School of Pedagogy.

Two hundred and forty-three names were enrolled in the courses offered in the School of Pedagogy during the session of 1899-1900—a greater number than during any previous year. Many students were enrolled in more than one course, and the actual number of students pursuing pedagogical work for the year was 100.

The following courses were offered: School Management, Methods of

Teaching, Psychology, Psychology of Education, History of Education, Philosophy of Education, Child Study, Pedagogical Seminary and School Supervision. In these courses many problems vitally connected with the progress of education in the State were considered, especially with a view of encouraging students to become seriously interested in the discovery of means for the improvement of the schools in which they are to become teachers.

The efficiency of the School has been greatly increased by reason of appropriations made for the Pedagogical Library and for apparatus used in the Psychological Laboratory. In the library are now to be found copies of the more important works on the several phases of education, as well as bound volumes of the leading educational and psychological journals and magazines. The Psychological Laboratory is now sufficiently well equipped for work in advanced as well as elementary Psychology.

It is worthy of note that forty per cent of the students in Pedagogy this session have been engaged in teaching for from one to fifteen years before entering the University. It is gratifying that so many teachers already engaged in the work appreciate the opportunity for Pedagogical training which is afforded them in the University of Texas.

W. S. S.

* * *

The School of Philosophy.

In the minds of the older graduates the School of Philosophy is associated with the memory of Drs. R. L. Dabney and Walter Lefevre, the former one of the most striking and forceful personalities ever connected with the University, the latter an unusually brilliant and effective scholar and teacher, whose untimely death is still mourned as a loss to the University and to the cause of philosophy. From students trained under the inspiring influence of these men good reports continue to be received. Among such students Dr. Albert Lefevre deserves prominent mention. After graduating he attended the Johns-Hopkins for a season, from there went to Cornell, where he won his doctorate with high distinction some two years ago, and after sharing in the editorial charge of the *Philosophical Review* for a year, crossed to Europe where he is engaged in further strengthening his equipment in philosophy, chiefly at the University of Berlin. It is to be hoped that at no distant day the finances of the University will allow of his being added to the teaching forces of his Alma Mater. Of students of a later day mention should be made of Miss Florence Lewis, a student of strong powers and of peculiar aptitude for philosophy. Two years ago she won the graduate fellowship in philosophy at Bryn Mawr College, and so high was the estimate there formed of her during the year of her incumbency that at its expiration she was awarded a traveling fellowship as the most distinguished member of the class of first year graduate students. Under the conditions of her appointment she is at present studying in Paris, France. If Miss Lewis should continue in the field of philosophy she will be heard from.

The notable facts for the School for the present year are the increased attendance, especially in Psychology, and the gratifying beginnings of a course in Sociology. The Psychology class more than doubled, partly because of Professor Ellis' efficient instruction, and partly because of the laboratory facilities furnished for the first time. Students find Psychology a practical and interesting subject, and with the increased laboratory equipment voted by the Regents for the coming year an even better showing may be expected.

Sociology also is a practical study, and has been pursued in that spirit by the members of the class engaged in its consideration. The last third of the year was given over to investigations of local problems, the results being summed up in papers by members of the class. Mention may be made of Mr. H. Lee Borden's study of the family in Texas, as based upon legislation and decisions of the courts, a study that presented special points of interest in view of the unusual concern the Texas government and people have from earliest days felt for the health of the family, as shown, among other things, by the earliest appearance of a homestead law on our statute books; of Mr. F. G. Lanham's study of the slums of Austin, a problem made timely by the exceptional conditions following the breaking of the dam; and of Mr. F. T. West's investigation of divorce among the negroes of Austin. In his undertaking Mr. West was much hampered by the failure of clerks of district courts to indicate the color of litigants, whether whites or negroes. This one simple item incorporated into the records would allow many investigations that would throw helpful light on the condition of our colored population, and would thus aid materially in solving the "negro problem." In spite of this and other difficulties Mr. West's paper is valuable, and will probably see the light in a prominent sociological journal.

On the whole the condition of the School of Philosophy is satisfactory, and the prospects are good.

S. E. M.

* * *

The School of Physics.

The development of the School of Physics in accordance with the modern ideas of scientific instruction has been especially marked. Not only has the course in elementary laboratory practice been enlarged and strengthened, but a strong beginning has been made in a similar direction in courses adapted to the needs of more advanced students. The laboratories in the basement, vacated in the fall by the School of Biology, have been equipped as far as possible with new fittings and apparatus of approved character; and, while necessarily incomplete, the instruction given is a presage of an enlarged growth and influence. So, also, in agreement with the general scheme, the lecture course offered to beginners in the subject has been revised and the fine collection of illustrative apparatus which the previous lack of workshop facilities left in great need of repair, has been completely overhauled and many new pieces added. Now courses in general physics

for second year students, and theoretical mechanics and modern physical apparatus for those more advanced have been added; and, in general, the attempt has been made to bring the work here in line with the progress made in other institutions.

We are pleased to call attention, in this connection, to the creditable work of two of our former students. Mr. G. W. Pierce, B. S., '93, and Fellow in Physics for the session of '93-'94, received a Whiting Fellowship at Harvard during '98-'99 and the John Tyndall Traveling Scholarship for '99-'00, an honor which he again holds for the coming year. The introduction to his thesis for the degree of Doctor of Philosophy, which he has just received, entitled "The Application of the Radiomicrometer to the Measurement of Short Electric Waves," has been recently published and well received by the scientific world. Mr. Fritz Reichmann, C. E., '96, Student Assistant '95-'96, Fellow '96-'97, Tutor '97-'98, held the Junior Fellowship in the University of Chicago in '98-'99, and now for the second time is the recipient of the Senior Fellowship. At present he is conducting an investigation on the "Specific Induction Capacity of Air," which bids fair to give results of considerable interest to physicists.

The work shop, which, though managed for the benefit of the whole institution, is under the direction of the School of Physics, calls for special mention. The shop room has been extended to twice its former size by the addition of the part formerly used by the Department of Civil Engineering, and the machinery relocated in more convenient relations. A planer, band saw, universal trimmer, and a large number of small tools have been purchased and new work benches and cases for tools constructed. In brief, the effort has been made to secure a model equipment and already it may be classed as one of the best fitted work shops in the South. Two skilled mechanics have been constantly employed in the construction of desks, cases, and apparatus for the various schools, and the results secured prove that it is an important factor in the economical and substantial development of the University at large. In its relation to the School of Physics, it has proved of prime importance for without it the growth already manifest would have been impossible. A large proportion of the apparatus acquired has been designed and constructed here, and much more is planned for early execution. The same is true, in a large measure, of its bearing upon the work of the other schools and a recognition of its value to all departments of University work is general. At present it is impossible to offer instruction in manual practice to the students at large, but it is earnesly hoped that in recognition of the value of the work of this character in its relation to general education and the more specific needs of technical training, such extension will be made as will make this possible.

L. B.

The School of Political Science.

During the year 1899-1900 six courses were given in the School of Political Science. Course 7 was prepared in accordance with a law passed two years ago by the Board of Regents, requiring all graduates of the Law Department to have one full course in Political Science. This course endeavored to give the student, as far as was possible in so limited a time, a firm grasp of the principles underlying all government, the elements of Economics and Constitutional Government. Using Marshall, Hadley, and Adams as textbooks, the student was required to do much outside reading and was aided by lectures on the elements of finance, taxation, labor problems, trusts, origin and characteristics of the State, the nature and seat of sovereignty, the functions of government, the form of constitutions, the separation of powers.

Course 1 was a more detailed study of the elements of Economics. This course has for some years been prescribed for all candidates for an Academic degree, but a recent ruling of the Board of Regents has done away with this prescription as regards women.

Course 6, Comparative Constitutional Law, was intended primarily for Seniors. It involved a careful study of the governmental arrangements of the United States, Canada, Great Britain, France, Italy, Germany, and Switzerland. Boutmy's Studies in Constitutional Law, Burgess' Political Science and Comparative Constitutional Law, and Lowell's Governments and Parties in Continental Europe were the works most often used.

The three remaining courses were arranged for students doing advanced work. Among other subjects, they dealt with Public Finance, topics in Industrial History, special topics for individual work. Transportation in Texas, and studies in Social Science, embracing Principles of Sociology and Practical Sociology.

The School is badly hampered for want of books. From the subjects discussed, it will easily be seen that any extensive work is impossible without a large working library. The truth is that a student is often stopped short in his work for lack of even standard works, and any reading or discussion out of the ordinary is impossible. Besides new books, more copies of works often referred to should be provided. Even the less advanced courses already advertised are difficult to carry on with the present equipment.

There is also great need of a larger teaching force. One hundred and seventy-five students were enrolled this year, making this School one of the largest in the University, yet one Associate Professor has the whole of the work. The course in Sociology was given only by the help of Dr. Mezes, though at a cost of much inconvenience to himself. Fortunately the course lay along a line of study that his own advanced students desired to follow. A well-trained instructor is needed, a man fully able to help carry on the present work and assist individual effort in other lines.

All modern universities are paying more and more attention to the teaching of Political Science, bearing immediately, as it does, upon the practical

workings of every State and community. It is the duty of all friends of this University to see that the proper facilities and equipment are provided for a study which touches closely the best interests of the State.*

H. B. H.

* * *

The School of Romance Languages.

Previous to September, 1899, instruction in Romance Languages was in charge of the Professor of Teutonic Languages, assisted by instructors. At that date connection between the two schools was severed, and to the School of Romance Languages were assigned an Adjunct Professor of Spanish, an Instructor of French, and a Fellow. At present French and Spanish are the languages taught. Whenever it seems advisable Italian will be added.

The chief aim of instruction in the School is to give students an opportunity to gain, largely through the intelligent reading of interesting texts and suggestive parallel work, an appreciative understanding and, as far as possible, a practical knowledge of the languages and literatures taught. The first year's course is given as a general preparatory course, including the essential principles of Grammar and their application, the reading of about 300 pages in the language, and varied exercises based on the texts read. Beyond the first year, an effort is made to meet in the higher courses the varying needs of more advanced students.

During the past session the total enrollment in the French classes was forty-nine, twenty-three taking Course 1, while the rest were distributed through the higher classes. There was no graduate class. Six courses were given.

Students who have completed Course 1 in French are prepared to take either Course 2 or Course 7. The former is intended for those who desire to study the language for the sake of the literature, and, as far as possible, to acquire a speaking and writing knowledge of French. For those, on the other hand, who wish to obtain facility in the use of French as an instrument of research rather than an end in itself Course 7—a rapid reading course—has been arranged. A number of fairly difficult selections are read, and graduate students taking the course are required, in addition to the regular work, to make careful written translations from text-books or journals bearing on the subject of their special research. Course 3 continues the work of Course 2. In both these courses (2 and 3) representative authors of the nineteenth century are studied. It seems best, at this stage of the study of a modern language, to read, with reasonable care, a considerable amount of suitable and interesting material, rather than to restrict the student to the extremely minute and thorough study of a few authors only. Frequently we meet students who, although they have had two or three years instruction in a modern language, soon lose almost all their knowledge of it. It would often seem that this is due, at least in

*Professor Houston is absent from Austin, and this note is compiled from his annual report to the President.

part, to the very limited experience with the language which results from the almost painful minuteness with which many teachers, inspired by a desire for thoroughness, devote to the reading of Hugo or Musset the research and care which, under very different conditions, are lavished on Browning or Keats. The student who first acquires a more extensive and varied familiarity with a modern language usually gains more practical ability. Besides, he is more interested. Later on, closer investigation is in order, and may more profitably be pursued. In French 4 the classical literature is emphasized. Provision is likewise made for a special conversation class and for graduate work.

In Spanish the total enrollment was 112 students, of whom seventy-eight were in Course 1, seventeen in Course 2, and the rest engaged in the more advanced work. Students manifest much interest in this language at present, and within the last four years the classes have doubled in numbers, and greatly improved in quality and efficiency. Much of what has been said as to the spirit, method, aims, and scope of the instruction in French applies likewise to that in Spanish. Next session six courses will be offered, besides Graduate work, which will be given as required. Owing to the local interest attaching to Spanish, an effort is made to render the work largely practical, and some special provisions have been made. It is contemplated to attempt to arrange a conversation course which, by affording students reasonable opportunities for sufficient practice, may secure satisfactory results. As an instrument in Texas History research, Spanish is indispensable, and it seems the duty of the University to bear this in mind, and seek to give direct assistance on that line. Some little beginning has been made in encouraging the translation of Spanish sources of Texas history, and, as the School develops, more will be done. While it will take time and patient endeavor, as well as more reference books than the School now possesses, to accomplish good work in this direction, the student body feel an interest in the matter, and, as far as possible, attention will be given to it.

L. M. C.

* * *

The School of Teutonic Languages.

The instruction in German will be considered under four different heads, viz.: Grammar, literature, philology, and science. For the practical use of the language a thorough and accurate knowledge of the grammar is required and the best training for that is a careful study of forms, the acquisition of a large vocabulary, and practice in speaking, reading, and writing. With the average student this preliminary work may be accomplished sufficiently well in two years to enable him to take up the literary work.

Two periods of literature are thoroughly studied, the classic period of Lessing, Goethe, and Schiller, and the present period. In the study of the classic authors the whole field of literature is opened to the student and the study becomes comparative, for no one could get the best results from the study of these authors without a careful consideration of the literature

of their contemporaries. This is peculiarly true of the modern period. Hauptmann, Sudermann, and other modern writers have received much of their inspiration from Ibsen, Tolstoi, Zola, and others who have made a world-wide reputation. It is this comparative work that lends to literary study its highest interest.

In philology little has been done. Having no graduate department where the regular work in philology is pursued as the real work of the student, the few sporadic efforts made here to introduce its study into the undergraduate curriculum have proved unsatisfactory. It is hoped that the University will soon be able to show something better.

In science the most that can be done now is to read scientific monographs in order to acquire a scientific vocabulary. This, of course, is useful to the student as it enables him to pursue his studies with greater facility. The proper way, however, to study scientific German is to have courses given by a competent instructor in each scientific school, and then the subject matter as well as the vocabulary could be taught. The advantage of this method to the student would be immense.

S. P.

* * *

The School of Zoology.

With the sad death of the much beloved and lamented Professor Norman almost at the close of the last session, it seemed to his intimate friends as if the School of Zoology had suffered a crushing and retarding blow just as it had reached the point of its greatest effectiveness. It seems now a token of special compensation that, at this moment of gloomy outlook, the man should have been engaged as successor, who, in common with but few zoologists, has given to Zoology the great momentum which has characterized its advance in certain lines in recent years. Prof. Wheeler came to Texas with an enthusiastic appreciation of its richness as a field for zoological research and, naturally, as in Botany, the chief energy of development is to be in the direction of a study of the Texas fauna. Within the year, great progress has been made in this direction as the numerous publications will show.

As to the location and laboratory facilities, what was said about Botany is equally true here, except to point out that, because of its long organization, the School is more effectively equipped. At the beginning of the session, the courses of study were reorganized to suit the new conditions, and the enrollment of students proved larger than in any preceding year. The regular Zoology courses, together with Physiology and Hygiene, gave to Zoology a registration in advance of any other science school in the University.

Perhaps the most significant event of the year, for Zoology, has been the establishment of a laboratory and facilities for the study of the Gulf fauna. This is to be known as the Marine Zoological laboratory, located at Galveston, where the biological laboratories of the Medical Department are at the management's disposal. The enthusiasm with which the Regents have sup-

ported this movement promises much for the development of various lines of extension of University activity.

Professor Wheeler and his assistants, with a few students, are spending this month (June) on the Gulf and in the laboratory at Galveston, inaugurating the movement which marks the beginning of a study of the marine life of this interesting region. The announcement of results and prospects will be awaited with interest.*

W. L. B.

THE LAW DEPARTMENT.

During the present session the Law Department has, in the main, "pursued the even tenor of its way," yet there have been some changes of interest and importance.

Judge Gould, whose presence in the Law Faculty since the organization of the University has been a sufficient guarantee of efficient work, feeling that on account of advancing age and feeble health he ought not longer to bear the burdens of undergraduate work, offered his resignation. The Regents replied by tendering him the position of Professor of Roman Law, with duties connected solely with the graduate class, and the matter was adjusted on this basis. So we still have the advantage of his presence and influence in the whole department, though his active labors are confined to the graduate class and such topics with the undergraduates as he may voluntarily undertake.

Col. W. S. Simkins was elected to the professorship made vacant by Judge Gould's resignation, and the work of the undergraduate classes has been done by him, and Professors Batts and Townes.

The night class was discontinued by the Regents, although there were about thirty applicants for matriculation in it. Notwithstanding the loss in this direction the attendance in the department has been decidedly larger than ever before, the Graduate class having eight, the Senior sixty-six, and the Junior one hundred members.

This growth in numbers necessitated a change in methods of instruction. The "Quiz" has been practically abandoned and the "Lecture," alternating at irregular intervals with written exercises, has taken its place. The old "Moot Court" has been superseded by the "Practice Court," in which trials are conducted through all their processes, from the institution of the suit to the affirmance of the judgment in the higher court. The change has proven practical and beneficial.

We are still in the basement doing our accustomed part in bearing up the whole University. We have not "grown weary in well doing" in this respect, yet we look forward with some pleasure to the time (as we hope) in the not far distant future, when we shall be called up higher and placed upon a level with the other departments. Our quarters, besides being too

*Owing to the absence of Professor Wheeler in Galveston this note was written, at the request of the editor, by Professor Bray.

close to the center of the earth, are too circumscribed laterally. We have no room in which the entire department can be assembled with comfort. This, though frequently an inconvenience, does not appreciably take from the effectiveness of the department. The lack of library space is a much more serious matter. The present room, which is by far the best under our control, can not accommodate the number of students compelled to resort to it for study purposes. The difficulties of the situation, of course, increase with each year's growth of the department. Besides more space, we need more books, especially Texas Reports and cannot do the best work until we get them.

We have not sufficient teaching force. The 166 undergraduate students of this year have taken all of the time of all the professors in charge of them and still in some important respects they have not had the assistance they should have had. Increased attendance from year to year is practically certain. There are from 300 to 400 young men studying law in different law offices throughout the State. Letters of inquiry are already coming in from persons desiring to enter next session. The present teaching force will bid them welcome, one and all, and promise to keep them busy, but we should be much gratified if the Regents should find themselves so situated that they could add one or more professors or instructors to assist in receiving them on their arrival and caring for them during their stay. We are assured the Board will do the best possible for the institution as a whole with the limited means at its command, and will cheerfully abide its judgment in the premises, yet we are extremely anxious for an opportunity not to do less work, but better work, work more helpful to the students at this time and more far-reaching in its results upon the interests of the State at large.

J. C. TOWNES.

THE LIBRARY.

In the establishment of one general library to be the center of the intellectual activity of the University we are most fortunate. In a recent visit to one of the leading colleges of the State, I was informed that they had five libraries. As might have been expected, these libraries were poorly supplied with books, and kept open a limited time each day. The society library idea which prevails in this college, and in so many other institutions of the South, and which is so prolific of waste of labor and duplication of books, and so barren of satisfactory results, has, happily, not been a problem in this University.

The University authorities have all along recognized the importance of a good collection of books necessary in University work. The fact that we have accumulated in seventeen years over thirty thousand volumes bears me out in this statement.

The time was when, aside from the languages and history and a few other departments, a dozen books covered all that a student was expected

to consult. This day is fortunately past. In this time of research and discovery, and of the wonderful advancement in science and art, the importance of libraries is greater than ever before. The report of nearly every professor in the University calls attention to our need of better library facilities.

The appropriation last year of $3000, a portion of which was set aside for the general library and the balance apportioned among the various schools, has enabled us to make some very valuable additions. Under ordinary circumstances this would have seemed a reasonable appropriation for the library. It must be remembered, however, that for several years the library had practically no appropriation, and a large portion of this sum had to be used in getting books and periodicals that should have been in the library years ago.

The schools of Botany, Chemistry, Zoology, and Geology have collections of books in connection with their laboratories. All other books, except those of the Law Department, are kept in the general library forming part of its collection.

The increased use of the library has been very gratifying. The number of books drawn for home use for the past year was almost twice as great as that for 1897-98; and the number of persons making use of the library has increased considerably.

Several donations of books have been received during the year, the most considerable being that from the estate of our late benefactor, Sir Swante Palm, which contains perhaps two thousand bound volumes, and a large number of newspapers and pamphlets. Among other donations may be mentioned that from Miss Daisy Bryan, a miscellaneous collection of ninety-four volumes; from Miss L. M. Casis, a similar collection of fifty-four volumes; from Messrs. Trezevant & Cochran a number of valuable books on Insurance.

The Library is always grateful for gifts, either large or small; and is especially anxious to receive copies of all books published in Texas, and books pertaining to the literature and history of the South.

The total number of bound volumes added this year is 1776. With the exception of the gifts mentioned above and the usual quota of public documents, and a few minor gifts, all were obtained by purchase and binding.

The Library aims to be of the greatest service to all its users. There are so many calls upon it, it is hard to say just what these aims are. I might mention several, however:

1. Its prime object is to help students and professors along the lines of study offered in the University; this includes not only specific references, but all collateral reading that may be assigned.

2. It aims to help those who are improving themselves by reading general books and periodicals, and especially to help those who are preparing debates, essays, and orations, in connection with their society work. Under this head, of course, come many calls for books in departments of learning, such as music, art, etc., which are not represented in the curriculum of the

University, and yet are of prime importance. It seems needless, therefore, to say that the Library needs a large general appropriation to procure books for these and to strengthen those departments which, though taught in the University, have not representative collections.

3. At present the University Library is made to serve the purpose of a general study room for the whole University. Many students live too far away to return to their rooms between recitations, and are consequently forced to find places to study in the building. In some universities special rooms are set aside as conversation rooms, where students who wish to talk and pass the time may do so without disturbing those who wish to study. In the absence of such a room, a portion of the Library has been set aside as a study section, where students are not allowed to talk, and where they are not subejct to frequent interruptions from loafers. This plan has worked admirably, and will be extended to cover a larger portion of the library room next year.

4. While the Library's first duty is to the University, numerous letters and visits from people interested in libraries through the State lead one to think the Library owes a duty to the other libraries in the vicinity. The interest given to the library movement by the donations of Mr. Carnegie has aroused nearly every town in the State to the importance of public libraries. These libraries are educational forces in this State, and the University Library should put itself in full touch with them, particularly in their formative days. Not only for its own direct patrons, then, but for the guidance of those around it, the University Library should be a model in every respect. To attain these great ends, the Library needs a definite and constantly increasing income. It needs a separate building and the fixtures of a modern library; and a library force of sufficient number to keep its service up to the highest possible efficiency.

The State of Texas needs a central library with a collection of books which shall be representative of this great State; a library whose books shall be of service, not only to the University, but to every serious student in Texas. The State library with its magnificent appropriation of $500 a year, crowded into a small room, cannot hope to do this. The college libraries of the State, of course, cannot do it; and the city libraries have fields of their own.

Here is a field for the University, whose library is already far ahead of any other in the State. Here is a field for some benefactor who shall establish for the University and the State such an institution as President Gilman must have had in mind when he said, in his address at the opening of the Sage Library of Cornell:

"So long as curiosity dwells in the mind of man—and when curiosity dies man will be but a beast of burden—so long will he inquire into the origin of man, his habits, his laws, his religion, his institutions, his failures, his endeavors. Our libraries, therefore, gathering up, handing down, arranging, interpreting and making public the lessons of the past, supply one of the most constant and one of the noblest demands of civilization. It

is not necessary to determine where the functions of the archæologist end, or those of the librarian begin. Both are the interpreters of human experience, the conservators of human records. The fly-leaf, the pamphlet, the book, the photograph, the palimpsest, the parchment, the inscription upon marble and bronze, the coin, the medal, the papyrus, and the wedge-lettered cylinder—these are the journals, the annals, the memorials of our race. Bring them together, founders of libraries; interpret them, professors of languages; give us their lessons, teachers of history; that the days to come may be better than the day of old, that the errors of science, of politics, and of religion may not be repeated, that the coming generation, standing on the shoulders of their forebears, may see farther and act more wisely than those who have gone before."

B. WYCHE.

GENERAL NOTES.

The New Catalogue.

The Catalogue of the University for the year 1899-1900 is just out. The University of Texas is one of the few institutions that think apparently that a catalogue should not be used during the session of its issue. It is true that the "Courses of Instruction by Schools," and a good deal more, are really announcements for the year following (and, by the way, they should be so stated), but there are manifest advantages in an early issue, and it seems surprising that the authorities do not more thoroughly appreciate them.

Nevertheless, the Catalogue for 1899-1900 as finally published is a handsome document. The paper is good, the printing excellent. Certain typographical features are clear improvements, notably the use of smaller type for the description of courses. One could wish a larger employment of this type, with its consequent reduction in the number of pages. The present issue, despite the new type, and despite the omission of the Specimen Examination Papers, occupying last year over six pages, is larger by thirty-eight pages than the last catalogue, showing 313 instead of 275 pages. In the examination of the causes of this increase are revealed the changes and additions which form a record of the growth of the University the past year.

W. J. B.

The New Degrees and Entrance Requirements.

The most important changes to be found in the Catalogue are those affecting the courses leading to degrees, and the requirements for entrance. It is not often that a year passes without some tinkering of this sort, but the action of the present year is more notable than any since the session of 1896-97.

As far back as the fall of 1898 a proposition was made in the Faculty for a single degree, after the fashion of Harvard and Leland Stanford. Prolonged discussion ensued, privately, in committee and in the Faculty. In the end the matter was referred to a new committee, with instructions to report the following Fall. Meantime, a committee of the Regents was at

work on the same question, and when the new Faculty committee began its sessions the conclusions of the Regents' committee, ratified by the Board, were laid before it in the shape of certain general propositions, which it was the judgment of the Board should serve as the basis for further requirements. The Faculty committee did not consider this intended to be mandatory, and therefore entered upon a discussion of the whole question of one or several degrees and their requirements *de novo*. In the final report to the Faculty a majority of the committee presented a plan providing for three degrees, while the minority recommended two. The requirement of Greek for the B. A. was the bone of contention. When the reports were presented to the Faculty, the recommendations of the minority for two degrees, and a B. A. without Greek, were adopted by a decisive vote, and the Board was requested to ratify the action. After two hearings of the case of two vs. three degrees, the Board decided in favor of the retention of three. To their mind the loss involved in granting the B. A. without Greek was greater than the gain. The working out of the details of the three degrees was referred back to the Faculty and the results of their deliberations are set forth in the Catalogue just published.

The salient features of the new degrees are these:

(1) Time requirements for entrance are equal.

(2) The Freshman year is largely prescribed.

(3) Each student must take three courses in each of two schools other than English.

(4) After Freshman year the curriculum is almost entirely elective.

(5) Students must select their courses in conference with the Advisory Committe.

(6) After the Sophomore year each student must select a major study and be under the special direction of the professor in charge, subject to the general supervision of the Advisory Committee.

Of these the most far reaching is the equalization of entrance requirements. Twenty courses have long been necessary for all degrees, but the degrees were not equal, for the entrance requirements were far from being equivalent. Henceforth the same English, History and Mathematics are required for all degrees, and, beginning with the session of 1901, Physiology and Hygiene, or Physiography. For the B. A. must be presented also Latin covering three high school years, and Greek covering one (formerly two). If the student has had no Greek he may begin it in the University, but no credit is given towards his degree for that part of the work which takes the place of the entrance requirement.

For the B. Lit. degree the same Latin must be offered as for the B. A., and a year of a modern language instead of the Greek.

For the B. S. degree the place of the B. A. Latin and Greek is taken by Botany and Chemistry, or Botany and Physics, or Chemistry and Physics, one high school year in each, with modern languages covering two high school years. As in Greek, if candidates cannot satisfy the entrance re-

quirements in modern language or science, they may begin these subjects in the University, but work so taken does not count towards a degree.

As has been stated, the new requirements do not go into effect for a year, but with a view to their being met by the high schools they are fully described on pages 24-30 of the Catalogue, and a special pamphlet is to be issued by the Committee on Affiliated Schools containing further information and hints on methods of teaching.

After entrance the requirements of the first year for all degrees are the Freshman courses in English and Mathematics, with Physical Culture; for the B. A., Freshman Latin also, and Freshman Greek; for the B. Lit., Latin and a modern language, or History, or a science; for the B. S., a modern language, or History, or Latin and a science.

In the Sophomore year English is required for all degrees; for B. A., Freshman Greek also if not taken in Freshman year; for B. Lit., a modern language; B. S., a science.

On the whole, the new scheme promises well. By the very large liberty of election opportunity is given for the cultivation of individual tastes and powers, and at the same time dissipation of energies and devotion to snap courses are effectively restrained. It is possible, indeed, for students to graduate from the University without any science whatever, but in this day of scientific enthusiasm such a thing is unlikely to occur. W. J. B.

* * *

The Alumni Scholarship.

For the first time in the history of the University the Catalogue contains a notice of a scholarship of large pecuniary value. "In June, 1899, the Alumni Association established a scholarship in the University of Texas. It is awarded annually to the applicant for admission to the University who stands the best entrance examination in English, Mathematics and History. Graduates of affiliated schools and others entitled to entrance without examination may compete for this scholarship. The value is $100. The scholarship for 1899-1900 was awarded to Conrad L. B. Schuddemagen, of Gonzales."

The creation of this scholarship is a notable event. It is the first, let us hope, of a long series of such benefactions. It is strange, indeed, that this form of doing good has not before appealed to our people of wealth. What more satisfying consciousness than that of having smoothed the hard pathway of poor young men and women to higher education? What nobler memorial to a loved one than to link his name forever with honorable assistance to struggling youth? W. J. B.

* * *

The University Co-Operative Society.

The Catalogue for 1899-1900 is the first to contain a notice of this organization. The paragraph runs thus: "The University Co-operative Society is an organization formed, in June, 1896, for the purpose of supplying the University with books, stationery, and athletic goods at the lowest prices consistent with safe business methods. It is composed of members of the Faculty and students who pay the annual fee of one dollar. The directors consist of the

Committee of the Faculty on Book-Store, together with representatives chosen by the society from the different classes and departments. No salaries are paid except to the clerks, two students who are thus assisted in making their way through the University. Sales are made at a uniform price to all persons connected with the University, but members of the society receive at the end of the year a rebate in proportion to the total amount of their purchases."

The objects of the society have been in the four years of its existence reasonably well attained. Goods have been sold at very reasonable prices, and considering the distance of Austin from the book centers there has been surprisingly little delay in supplying books when needed. It is to be regretted that the society has not a larger membership. The cause is doubtless to be found in the fact that the lack of capital in the first three years necessitated the borrowing of money and prevented the payment of a sufficient rebate to attract new members. The society is now, however, free from debt, and has a small running capital, so that better results may be looked for in the future.

The society can and should be of much more service to the institution than it has been able to be in the past. Its ideal is to do everything that comes within its scope, but this can only be attained gradually. Similar societies at other institutions have attempted the sale of general merchandise, but this would manifestly be out of place here.

W. J. B.

The Growth of the Universities in Numbers.

The summary of students on page 300 of the new Catalogue shows, as perhaps may be expected henceforth, its chief increase in the Department of Literature, Science and Arts. The figures for this department may be assumed to include also the Department of Engineering, though this is not stated. The increase in these departments is eighty-nine, in the Department of Law twelve, in the Department of Medicine sixteen. Deducting repeated names we find the increase for the whole University to be seventy-one. At this rate we shall be long in reaching the two thousand mark, which the success of the great State universities of the northwest leads us to think possible also in Texas. It is gratifying, however, to note the marked increase in the number of Juniors and Sophomores. Heretofore, one of the most discouraging phenomena of education in Texas has been the insignificant proportion of Freshmen who take their degrees. Last year there were only one-fourth as many Sophomores as Freshmen; this year there are one-half. Of Juniors there are this year half again as many as in 1898-99.

The following table shows in detail the growth of the University for the past five years:

	1895-96.	1896-97.	1897-98.	1898-99.	1899-00.
Graduates	14	13	18	20	35
Seniors	24	28	28	23	29
Juniors	33	18	27	31	46
Sophomores	45	39	59	50	91
Freshmen	174	140	174	199	184
Irregulars	...	...	...	61	113
Specials	53	84	102	88	63
Total	343	322	408	472	561
DEPARTMENT OF LAW.					
Graduates	1	4	6	8	8
Seniors	42	59	51	60	66
Juniors	101	80	88	89	95
Total	144	143	145	157	169
DEPARTMENT OF MEDICINE.					
School of Medicine	214	235	194	147	156
School of Pharmacy	34	35	44	40	45
School of Nursing	...	18	21	19	21
Total	248	288	259	206	222
Total in the University	735	753	812	835	952
Names repeated	5	2	12	36	82
Net total in the University	730	751	800	799	870
Summer Schools					171

Owing to the non-completion of the improvements made at University Hall it was impossible to have it ready for students at the beginning of this session, but it was opened immediately after Christmas and filled up quite rapidly. Almost one-half of all the rooms have been occupied. The number of boarders has averaged about fifty. Of these about forty have roomed at the Hall. The board has been $12.00 and the room rent $3.00 a month, making for two in a room $13.50 a month for each. True to the divine right of free born American citizens to "kick" there have been complaints as to the management, but satisfaction has been more general and complaints less frequent than in any of the past three years. The Hall has been in charge of Mrs. M. E. Hicks.

University Hall.

Concerning the building itself there is much to say. Externally, from an æsthetic standpoint, there is possible no comparison. Within, a boarder of

old B. Hall would note many things—the inside stairways (no more walking around in the mud and rain to get to meals); the bath rooms, more commodious and fitted with the best quality of fixtures; the balconies, one to nearly every room; the two "roof gardens" and the upper dormitory. Students who have sat shivering and "scraped the radiators" of the old hot water system will be glad to learn that henceforth the Hall will be heated from the University boiler house. There has been set aside a nicely finished suite of rooms for the use of visiting Regents.

The Hall will doubtless be filled next year, and it will become more than ever before the center of University life for the boys.

E. E. H.

* * *

The University and the Affiliated Schools.

The Regents and the Faculty recognize that the University is the natural as well as the logical head of the system of public education in the State and desire to cultivate the most cordial relations with the lower schools of the State. Any school that affords to its students sufficient training to enter the Freshman class of the University may become affiliated with the University and its graduates will be admitted to the University without entrance examinations. The conditions upon which affiliation may be secured are as follows:

1. The course of study which obtains in the school seeking affiliation must be approved by the Faculty Committee on Affiliation.

2. Specimen examination papers prepared by the students of the school must be submitted and approved by the Committee on Affiliation.

3. The course of study and examination papers being approved by the committee, the school must be visited and inspected by the President or some one he may designate. The report of the inspector being favorable the school will be affiliated by a formal vote of the Faculty.

Complete affiliation includes English, History, Mathematics, Latin, and Greek. No school can be even partially affiliated, however, if its work in either of the first three subjects above named is unsatisfactory. In 1901 affiliation will be extended to include Natural Sciences and Modern Languages.

During the current session seventy applications for affiliation have been received and twelve schools have been affiliated, some wholly, some partially. Some schools have been refused affiliation and a few previously affiliated have been dropped. Many schools have taken the initial steps necessary to their affiliation and in some cases the remaining steps will be taken next session.

Since last September many of the schools already affiliated and some seeking affiliation have been visited by members of the University Faculty.

W. S. S.

* * *

Addresses by President Prather.

During the past year, although much pressed by his duties at the University and by the work necessary in readjusting his private affairs, President Prather has found time to deliver several public addresses. Before his election to the presidency, the Board of Regents requested him as Chairman of the Board to make an address at the opening of the University in September. This address was published in full in the October number of the RECORD, and has received frequent and favorable comment from the press of the State. On March 2nd he again addressed the students and the citizens of Austin on the occasion of the presentation of a Texas flag to the University by the local chapter of the Daughters of the Republic of Texas. Some weeks later he responded to an invitation to address the State meeting of the ex-Confederates at San Antonio. Again, on the occasion of the meeting of the State Medical Association at Waco he addressed that Association, after the report of the Judicial Council was read and adopted, in which report he was named as an honorary member of the Association. A short paragraph in that speech indicates so strongly the controlling motives that have actuated him in accepting the presidency of the University of Texas that it is here quoted:

"The University of Texas, standing as the head of the great public school system of Texas, must be naturally the directing power of the three-quarters of a million of children that are being educated today in Texas, on which this great people are expending annually more than $3,000,000. It is a great business interest, and following the trend of modern thought the Board of Regents has expressed its desire that it should be conducted along business lines. To that end I have given up a profession that I love, I have given up a home where I have lived for nearly a half a century. It is because I have an earnest desire to follow the heroic examples of the great physicians of this State, who labor not only for themselves, but who work for the amelioration of human suffering and betterment of mankind. It is because I go to raise the standard of manhood and womanhood in the State where I have lived all my life."

After declining many invitations to deliver Commencement addresses, President Prather received from Provost Harrison of the University of Pennsylvania a formal invitation to deliver the annual address of that institution. This invitation was supplemented by such strong appeals from members of the Medical Faculty who are graduates of the University of Pennsylvania that it was difficult to decline. Especially was this so because of the terms in which Provost Harrison couched his letter. He stated that the honor came as a recognition of the influence of the Southwest in the educational movement in America, and as a manifestation of the appreciation of the part played by the University of Texas in this movement. No greater honor has come to this institution since its foundation and no one episode will do more towards making it known throughout the English speaking world. J. A. L.

Dean Houston.

The honor of being appointed member of the Board of Visitors of the United States Military Academy is so distinctive as to warrant special mention. This appointment comes to Dean Houston as a recognition of his worth and work, supplemented by the active and untiring efforts of the Congressman from this district, one of our alumni, the Hon. A. S. Burleson. Since going to West Point Dean Houston has been honored by the Board of Visitors in being elected to its vice-presidency. This honor is a great one when we consider the number of distinguished men constituting the Board. He has as fellow members General Manderson, ex-Senator and President pro tem. of the Senate; General McCook, ex-Secretary of the Senate and ex-Congressman; Col. Church, editor of the Army and Navy Magazine, and many others, equally prominent in military and civil life. J. A. L.

* * *

The Administrative Offices.

The work of keeping the University of Texas in a favorable light before the people of the State has been actively carried on throughout the year on the lines of policy inaugurated a few years ago. Weekly news-bulletins are mailed to the leading daily papers of the State, and each month a printed bulletin containing interesting news matter about the progress of the University is sent to every weekly newspaper in Texas. These items have been widely copied, not alone by the Texas papers, but also by educational and secular periodicals throughout the United States. At intervals throughout the year descriptive and illustrated "write-ups" of some length are sent out to the high school papers, to the educational journals, and to those of the daily papers that desire such matter. A special copy of the RECORD, containing the catalogue in abbreviated form, has also been distributed during the past year. This issue numbered ten thousand copies. They were sent out to banks, leading stockmen, farmers, lawyers, doctors, and to men of every vocation in life, wherever, in short, good for the University seemed likely to be accomplished. An illustrated handbook of views of the University will be made to serve the same purpose during the coming session.

It is expected that the Regents will continue this policy of advertising the University. Heretofore they have annually appropriated $1000.00 to be spent among the leading newspapers of the State in advertising during the summer months. The flow of letters of enquiry coming back causes the offices to be burdened with a large correspondence growing out of the interest in the University aroused in every section in the State. Many people are just beginning to find out that we have at Austin a University of the first class, and the tide seems to be turning this way. The constant increase of students in the registration at Austin is recognized to be due to this advertising policy, coupled with the activity of the Affiliated School Committee and other forces that are at work to bring the attention of the people of the State to the University. The amount of work done by the offices can be best illustrated by noting the fact that more than $1500.00 worth of stamps is used annually.

The work growing out of the distribution of the printed matter and letter writing noted above is considered only one of the minor duties of the offices. Their chief function is to minister to the wants of the students and professors of the University. It is here that the lists of grades and absences are filed and copied in the permanent records. Here is found a general information bureau for the entire institution. It will not be long before the present force will prove wholly inadequate. J. A. L.

Dr. Abbott.

The presence of Dr. Lyman Abbott, editor of the *Outlook*, in Texas, as a visitor to the State University, will be appreciated by every lover of education and culture in the State. Dr. Abbott comes thousands of miles to deliver by voice a message couched in the simplicity of style and diction grown so familiar to the thousands in this State who read the product of his pen in the *Outlook*. We feel honored in his visit, and trust he will return home with pleasant memories and good words for Texas. J. A. L.

Grace Hall.

Many years ago Miss Burr, of New York, gave $10,000 to Bishop Alexander Gregg to be devoted to the cause of woman's education in Texas. A college for women was at first intended, but the sum was insufficient, so the bishop waited. After Bishop Gregg's death, Bishop Kinsolving, seeing the splendid advantages that the State offered in the University free to its daughters, concluded that it was needless to duplicate this instruction, and, indeed, hopeless to attempt to rival the State's generous expenditure, so he gave up the plan for a separate college and determined to build a hall for women in connection with the University. There the influences of a Christian home should be thrown around them, and there instruction should be offered in music and art and such other branches of a woman's education as could not be obtained in the University.

The fund was slowly enlarged by additional donations, and at last the building was begun on one of the finest sites in Austin, adjoining the bishop's own home. Its name is at once a tribute to one of its most generous friends and a symbol of the grace of character and manners that is peculiarly woman's heritage.

The south wing was finished and opened in the fall of 1897. Last year two large music rooms were added. In May, 1899, the corner stone of the memorial chapel to Bishop Gregg was laid. The chapel now stands completed on the northwest corner of the grounds. The main part of the building will probably be put up within the next two years. Its plan includes additional bedrooms, a gymnasium, library and large reception rooms.

The Hall now provides accommodation for twenty-six students, and is under the charge of Mrs. J. M. Leisewitz. It is heated by steam and lighted by electric lights. The rooms are carpeted and completely furnished—each girl having her own arm-chair, book-case, and single bed. The grounds are

large and well drained. In the northeast corner a tennis court has been laid off.

The Hall is really a home for young women in the University. It is open both to undergraduate and graduate students. More privileges are naturally granted to the members of the upper classes. The first arrivals on the opening of the Hall in the fall are the Freshmen. They hope to gain experience before the coming of their seniors, dignified and critical. Some of their timidity is lost when they learn that they are to sit together at one table, while the upper classmen are seated at another. Every student is expected to be guided by a few time-honored customs, which make college life all the more pleasant. The first lesson is that lights are turned off promptly at eleven o'clock. Sunday afternoon and evening are reserved by the young ladies for the reception of their friends among the young men. On no other day are they entertained.

The social side of the student's life is not neglected. There is always present that atmosphere of social refinement so valuable in the experience of the student. The event that is looked forward to with greatest pleasure is the annual "Colonial Ball," given by Mrs. Leisewitz to the Grace Hall girls. On the day following the Winter Term examinations, the young ladies accept an invitation to take lunch with the sculptress, Miss Elizabet Ney. In winter a short dance is enjoyed twice a week. In spring the routine work is relieved by an outing on the river. Lastly Grace Hall is sometimes the scene of the final reception of the Ashbel Society.

Grace Hall being intended for students only, every possible convenience is offered for hard study. A glance at the record that the Grace Hall students have made in the University will show how well they have availed themselves of every advantage. There is a great deal of friendly rivalry among the students for the largest number of A's (the highest mark of excellence) on term examinations. Unless a student can boast of at least two she will have little attention accorded her. For the last two years a Freshman has carried off the palm by receiving six.

E. R.

* * *

University Colors.

After much discussion and a spirited contest, we are now the proud possessors of official university colors. In accordance with the resolution of the Board of Regents passed February 27, 1900, the Faculties and students of all departments and the alumni participated in a vote for the settlement of the color question. The total vote was 1111, of which orange and white received 562, orange and maroon 310, royal blue 203, crimson 10, royal blue and crimson 11, scattering 15. Thus, by a majority of 7 over all competitors orange and white came out victorious, and were duly declared official colors by the Regents at their May meeting in Galveston. This is as it should be. Early traditions, unless vicious, should not be trampled upon. How could those who have fought for years under our banner recognize another

as representing their early friends and principles? Those who championed other colors have not allowed individual preference to get the better of their University patriotism, so that now there are no factions in this important matter. This is another step in the right direction, another evidence of the rapidly growing harmony which must be fully developed before we can hope to attain our ideals. D. A. P.

* * *

Resignations in the Faculty.

The Faculty suffers the loss of two of its strongest members this year, both of whom voluntarily resign to accept positions offering wider fields of usefulness. Dr. Leonard E. Dickson was graduated from the University of Texas in 1893 with the degree of Bachelor of Science. During the following year he was fellow and graduate student in Mathematics. The thesis he submitted for the Master's degree not only won that degree, but upon it he was awarded both a scholarship in Harvard and a fellowship in the University of Chicago. Going to Chicago, after two years of graduate study he received the degree of Doctor of Philosophy, *magna cum laude*. After spending a year in Europe, principally under the tutelage of the great German mathematician, Sophus Lie, he was called to the University of California. He taught there for one year, and then accepted a call to serve his alma mater as Associate Professor.

It was hoped that Dr. Dickson would be content to devote his life and talents to the University of Texas, but the opportunities for advancement, the wider field for work in the higher branches of mathematics offered by the University of Chicago, have proved too attractive, and he leaves to become Assistant Professor of Mathematics in that institution. His work in the University of Texas has been highly successful. Chiefly under his direction the bugaboo of freshman mathematics has lost many of its horrors. He also taught a class during the year in the field of his special interest—the Group Theory. With mathematical genius of a high order, success is sure to attend him wherever he goes. In his upward progress his friends and associates here will always take an especial pleasure and pride.

Three years ago Professor Liddell came to the University as Professor of English Literature. After one year of service he was placed in charge of the English School. The Regents again showed their appreciation of his merits by making a substantial advance in his salary after another year had elapsed. Two promotions, coming in such quick succession, are rather unusual in the annals of this University. In Professor Liddell's case, however, no surprise was felt by those acquainted with the character of his work. Student feeling in the matter is shown by the numbers enrolled in his classes, and by the universal expressions of regret upon the announcement of his withdrawal from the University—a regret shared by all his associates in the Faculty.

Professor Liddell is an aggressive, forceful teacher; resourceful in ideas, and master of a vigorous style of English. The possession of these qualities would always keep him at the head in the teaching profession. It is

the recognition of his value to the educational work that has prompted a large publishing house to make such offers for his services that he has felt in duty bound to accept the call. He goes away from the University to the quiet of his library, from which the world will hear from him in earnest words spoken through books. From a teacher in Texas he will become the bearer of a message to the world of English thought—a message that concerns the fundamental principles of teaching our language, and one that will ultimately assume its rightful place among established pedagogical principles.

While Professor Liddell is yet among us, it hardly seems appropriate to speak of his personal qualities. So strongly have they influenced his teaching that a word must be pardoned. Some Puritan ancestor has endowed him with a conservatism of thought and action that comforts one in these days of populism and sweeping generalities unsupported by truth. Coupled with this is an earnestness of manner, a directness of purpose, that at once reveals a source of his power. His work has been done quietly, thoroughly, effectively. The story of his faithfulness to duty, his loyalty to the interests of the University, the unselfish spirit he has carried into much service, the performance of which he voluntarily assumed—all this will most likely remain in the unwritten history of the University. But its influence will not be forgotten; nor will the charm of his personality, the devotion to duty shown in his daily work and life, ever cease to be a factor in the ideals that shall one day be realized in a true 'Varsity spirit. J. A. L.

The Summer Schools.

The third annual session of the University of Texas Summer School and University Summer Normal began June 5th, about 100 students being in attendance. It is believed that before the close of the session (July 21st) fifty or more additional students will register. The Summer School offers instruction to teachers who wish to raise the grade of their scholarship and to such students of the University as desire to continue their studies during the vacation. In the summer school this year there are courses offered as follows: Chemistry 1, English 1, French 2, German 2, History 2, Latin 2, Library Science 1, Mathematics 2, Pedagogy 2, Philosophy 2, Physics 2, and Physiography 1.

The University Summer Normal is conducted for the benefit of teachers who wish to raise the grade of their certificates. Among the teachers in attendance this year are some desirous of securing the permanent certificate and some the first grade certificate. The normal has become a permanent feature of the University's summer work, and its influence upon the teachers and schools of the State will no doubt be substantial and beneficial.

W. S. S.

The Texas Academy of Science.

At the regular meeting of the Texas Academy of Science, held in the Chemical Lecture Room of the University, February 16, 1900, Dr. Harry Y. Benedict, Instructor in Mathematics and Astronomy, spoke on "Astronomy in the XIX Century." His remarks took the form of a summary of the achievements in that branch of learning during the past hundred years. Professors Halsted, Harper, Ellis and Mezes took part in the discussion which followed. It was made apparent in the paper and the discussion that in the astronomical work of the century Americans had played a leading rôle.

Dr. Leonard E. Dickson, Associate Professor of Mathematics, read a paper entitled "An Elementary Account of the Problems Solved by the Modern Group Theory."

"A problem in mathematics usually depends upon the solution of an algebraic equation or upon the integration of a differential equation. By considering the group of an equation, finite in the former case and continuous in the latter, we are able to decide whether or not the equation can be solved by radicals or integrated by quadratures. More generally it tells what series of simple problems may be taken in the place of the original problem. The group of a problem not capable of such a reduction to a chain of simple problems is called simple. To borrow a chemical term, these simple groups are the 'elements,' to which any problem in its final analysis is to be reduced. The present state of our knowledge of these elements was discussed both for finite groups and for continuous groups."

Professor T. U. Taylor, M. C. E., of the Chair of Applied Mathematics, presented an abstract of his report to the Director of the U. S. Geological Survey on "The Silting up of Lake McDonald, Austin, Texas." A comparison of the cross-sections of the lake at sixteen different stations, averaging 1¼ miles apart, for 1893 and 1900, shows that the lake had silted up 48 per cent of its original storage capacity, that when reduced to a square mile base there was, in 1893, a storage capacity of 81 feet in depth, but in 1900 only 42 feet.

On account of the very inclement weather the March meeting of the Academy was postponed. At the meeting held April 20, Professor Taylor discussed the "Failure of the Austin Dam." Owing to the unprecedented rain-fall, and consequent flooding, the Colorado river burst the great dam at Austin on the morning of April 7. Professor Taylor went carefully into the details of the failure of the structure to withstand the action of the river as viewed from an engineering standpoint. Among those who took part in the discussion were Messrs. Mather, Hill, Simonds and Garrison.

Dr. Simonds, President of the Academy, at this meeting read a paper on "The Interpretation of Unusual Events in Geologic Records."

The program for the formal meeting of the Academy, June 18, is as follows:

"The Nature of Justice," Dr. S. E. Mezes.

"The Development of the Present Texas Railway System," R. A. Thompson, Engineer to the Texas Railroad Commission.

"Mind and Brain," Dr. Edmund Montgomery, Hempstead, Texas.

"Note on the Marte and Bluff Meteorites," Prof. O. C. Charlton, Baylor University, Waco.

"The Relation of the Work of the Sanitary Engineer to Public Health," Prof. J. C. Nagle, A. and M. College.

"My Experience with a Siphon Pipe Line," John K. Prather, B. S., Waco.

"Fossils of the Fort Worth Limestone near Waco," John K. Prather, B. S., Waco.

"Research Work in the Laboratory of Organic Chemistry, University of Texas," Dr. Jas. R. Bailey and Messrs. Acree, Kirk, Knox and Palm.

F. W. S.

* * *

The Texas State Historical Association.

The Texas State Historical Association was organized March 2, 1897, and is, therefore, now starting on the fourth year of its existence. The membership numbers about nine hundred, and the exchanges one hundred and fifty or more. Much interest in the Association has been shown by the people of the State, and it continues to manifest a healthy growth. It has had many gifts of books, manuscripts and relics of great interest and value, and its collection is being rapidly enlarged.

The *Quarterly* of the Association has just completed its third volume. It has contained several documents of great value for Southwestern history, and never before published. Among these are the "Prison Journal" of Stephen F. Austin, the journal of W. S. Lewis, relative to the fortunes of the "Lively" immigrants; the letter of Fray Manzanet concerning the Spanish expeditions against Fort St. Louis and the founding of the first Texas mission, San Francisco de los Tejas. The articles it has published on the route of Cabeza de Vaca have attracted much attention from American specialists in Southwestern history and archæology, and have encountered some fierce and influential adverse criticism; but it is evident that they are valuable contributions to the literature of the subject, and that they will force a revision of the opinions that scholars have held as to some important questions about the route.

While the Association has nominally no connection with, and while it is neither supported nor controlled by the University, it draws its life largely therefrom, and has, in the main, the same interests. The sentiment of respect for the history and traditions of Texas and for the State itself, which it is one object of the Association to foster, is that whose general prevalence is necessary to give the University its largest measure of influence and prosperity.

G. P. G.

* * *

STUDENT INTERESTS.

The Athenæum.

This has been a very pleasant and profitable year for the Athenæum. The membership has been larger, the attendance more regular, and the interest in the work more manifest than for several years past. This awakened interest has shown itself in the weekly meetings and in the spirit and zeal with which the members have entered every contest. And the Athenæum has had its share

of the honors of the year. An Athenæum man represented the student body at the banquet on University Day at the Dallas Fair. An Athenæum man represented the University in the Southern Oratorical Contest, which was held last May in Columbia, S. C.; and at that meeting another member of the society was made president of the Southern Oratorical Association for the coming year. Two members of the Athenæum were chosen to represent the University in the annual debate with Baylor University. This debate resulted in the recovery of the honors lost on two previous occasions.

During the year the Athenæum has been generously remembered by its friends. Mr. Edward Rotan, of Waco, has endowed an annual fifty-dollar medal for the best original oration, while President Prather has kindly presented the society with an excellent picture of Mr. Rotan.

The Athenæum has also been making progress in a material way, though much remains to be done. A beautiful carpet has just been laid and other improvements are contemplated. During the coming year it is hoped the society will be able to calcimine the walls and seat the hall with opera chairs.

The four presidents of the Athenæum during the year have been Chas. S. Potts, R. Ewing Thomason, Holland E. Bell, and Geo. T. Cope. Thos. Fletcher has served as editor-in-chief of the *Magazine* during the last two terms. E. Taylor Moore, Jr., will represent the Athenæum on Society Day during Commencement Week. C. S. P.

* * *

The Rusk.

The session of 1899-1900 has been one of prosperity indeed for the Rusk Literary Society. There have been enrolled eighty-one members. The number in regular attendance has been more than double that of last year. Messrs. W. H. Adamson, of Mexia, Texas; Jno. A. Mobley, of Athens, Texas; Samuel Shadle, of Weatherford, Texas, and Martin J. Arnold, of San Antonio, Texas, have served as presidents.

All members meet in hall until orations and declamations are delivered. For purpose of debate the society is then divided into three sections which meet in separate rooms, thereby putting twelve debaters on the program each night. After the discussion all return to the hall, where five minutes are given each member for purpose of irregular debate.

The democratic spirit that has long prevailed in the Rusk not only still exists, but is intensified. The members almost without exception show marked improvement both in forensic speaking and in debate. The work throughout has been characterized by energy and enthusiasm.

Congressman Albert Burleson has presented the society with a very valuable work on parliamentary law. Mrs. Mary E. Coke, widow of the late Senator Richard Coke, has generously provided for an annual sum of fifty dollars for the purchase of a medal, to be awarded by the Rusk Society each year to its best debater. Mr. A. Jones, of Lockhart, Texas, won the medal in contest this year.

Many strong members of the Rusk will return next year, while a number

of students who thus far have taken no interest in society work have expressed an intention of becoming active members next session. The prospect of the Rusk is, therefore, very flattering, and we predict the most useful year since its organization. *Sic itur ad astra.* J. A. M.

* * *

The Ashbel.

This society, composed of twenty-four of the young ladies of the University of Texas, has had its full complement of members, and looks back upon a pleasant and profitable year. At its regular bi-weekly meetings the programs have been of unusual interest. The titles of a few will show the design to concentrate the intelligent efforts of all participating upon one theme: "The Works of Mrs. Browning," "An Evening With Rudyard Kipling," "An Hour With John Ruskin."

For the first time in its history the Ashbel has had a room of its own, and there is a just pride in its neat appointments. Could taste fulfill its fond desires, there would be busts and some good pictures, but the number of millionaires in the society is as yet limited, the possession of wealth not being one of the requirements for membership.

At the last meeting of the session, the ex-Ashbels and ladies of the University Club were the invited guests in Ashbel Hall. The Ruskin program was rendered on this occasion in a very pleasing manner.

Instead of the usual public debate a novel entertainment "Current Literature," an original comedy, was placed upon the Auditorium stage, and proved provocative of much merry laughter. Even grim-visaged care smoothed out his wrinkled front, and as this was the design of the Ashbel girls they feel that their effort to amuse was appreciated, and they are "advertised by their loving friends" with only two dissenting voices.

During the session an Ashbel representative for the first time was chosen to serve as editor-in-chief of the *Magazine*, and in this responsible position Miss Jessica M. Clark won laurels for herself, and reflected honor upon her society.

The Ashbel is true to its motto: "*E pulvere ad astra.*" Out of the dust of academic contest to the glorious stars, a noble effort day by day, with a limitless uplift and expansion of intellect and spirit! It is this ideal which inspires the members, and makes the Ashbel beloved of alma mater, "the rose and expectancy of the fair State."

Among the year's incidents we must not omit to chronicle the prize offered to the society by the Hon. V. W. Grubbs, of Greenville, Texas, for the best essay on "State Industrial Education for Girls." For this beautiful pin or medal the design was furnished by Caldwell, of Philadelphia—a Texas star, the points filled in with pearls, surrounding an illuminated monogram and the donor's name. Misses Florence Magnenat, Cincinnati Willis and Edith Lanier Clark will contest for this prize on the evening of June 18, in the Auditorium of the University.

On the 14th, at 8:30 p. m., the Ashbel held its annual reception, and extended welcome to the students, the Faculty, the Board of Regents, resi-

dent ex-members and visiting alumni. For this occasion the spacious lawn of the Episcopal residence and Grace Hall were thrown open, and brilliantly illuminated, and this pretty scene ushered in the graver exercises of the Commencement of 1900.

Long life and continued success to the Ashbel! F. S. C.

* * *

The Y. M. C. A.

The Young Men's Christian Association of the University of Texas is not a prayer meeting, is not a religious meeting of any character; it is what its name expresses, an association of Christian young men. It is true that this association conducts regular meetings every Sunday, but these meetings are not the association, they are merely factors to keep the members in touch with one another, and with the Master.

The association is not limited to a meeting room—it is a bond which is to unify Christian men in every field of college life, that the influence of their lives may make clean and strong those things in which they engage. Its aim is to hold before men ideals that are high, and strong, and pure. It is not a denominational nor a sectarian institution. As truth and right, as kindliness and charity, and manhood and honor, are world-wide and know no creed, so the association recognizes no church distinctions, and no creed save only belief in a common Master, and an earnest purpose to make themselves and their fellows better men, better citizens.

In this last year the association has been given one of the best rooms in the University. It has conducted successfully a series of lectures popular in their nature; has organized and had some success, it is believed, with a student employment bureau, and has endeavored, as its mission is, to stand for things the strongest and best in the University. There has not been as much accomplished as the supporters of the association would like, but we believe that the time is not far off when the association will be a mighty factor for good to the University and the State. J. C. H.

* * *

The Y. W. C. A.

This organization, the object of which is Bible study and Christian work, has been a powerful though quiet factor in producing the present wholesome atmosphere of our student life. The work of this association has been especially effective this year. The membership, which has been almost doubled, now numbers fifty-three. It has, outside of its regular work, contributed twenty-five dollars toward supporting Mr. Brockman, the representative missionary of the Southern colleges in China. This fund has been raised by small individual contributions, for the most part at the rate of five cents a week. The association is to be represented at the Asheville Young Women's Christian Conference this summer, and hopes thereby to get many new ideas for more effective work next year.

Besides its distinctly religious work, the association also looks out for the social life of the students, and this year, as usual, gave a reception at

Mrs. Kirby's to all the young women in the University. It can claim at present no room of its own in which to hold the weekly service, but uses that of the young men. Next year it will have a half interest in the Ashbel room, and from this arrangement anticipates much satisfaction.

M. H.

The Cactus.

The University *Annual* for 1900 is just being issued, and will be on sale at the University during Commencement Week. The cover, which is in white and gold, should be especially acceptable to the alumni who have this year fought so stoutly to retain these as the University colors. The effort has been made to make this *Cactus* representative of every phase of University life and interests. There are pictures not only of the classes and student organizations, but also of the President, Faculty and Regents. A well-written article with numerous full-page illustrations shows us with what amount of equipment the University stands prepared to carry out its mission in the century just dawning. The usual departments are devoted to athletics, literary societies, clubs, publications, etc. There are pictures of all the classes. A large section of the book is devoted to the medical college at Galveston, and makes a creditable showing for the students there. Indications are numerous of the large share the co-ed. is beginning to take in 'Varsity affairs, her interest in athletics being shown by pictures of the girls' gymnasium and a basket-ball team. The picture of a sorority is also to be seen for the first time in the space dedicated to secret societies.

Like every other student publication at the University, the *Cactus* suffers somewhat from lack of literary material. This fault lies with the students and not the book. There is, however, some very good reading matter in this volume. "The Flying Dutchman," by Mr. Durell Miller, is a piece of exceptionally good narrative work, and smacks of the brine in a natural way. His poem, "A Texas Norther," is also good. Other good pieces of verse are Mr. Clark's "Song of the Sea," Mr. Lomax's "Flower Song," and Mr. Sinclair's class poem, "To the South." "Alumnus," by George Calvert McClendon, is written in a lilting measure that will commend it to all.

Probably the best drawing in the *Annual* is Mr. Rector's introductory page to the Law Department, but there are numerous other good things from his, Mr. Thomson's and others' pens. The ever-present student humor finds copious expression in skits, caricatures and grinds. Remembering the fondness of the students for Lake McDonald, the editors have perpetuated some of its most pleasing aspects by means of full page half-tones.

The *Cactus* this year is entirely a Texas production, only the cuts having been made outside the State. The printing and binding was done by Ben C. Jones & Co., of Austin.

B. H. M.

Knowledge and pleasant, helpful associations are the two chief things which a young man seeks in his college or university career. The first is naturally emphasized by those whose duty it is to instruct, and the search after it should be the highest aim of each student. The second is scarcely less important in the effect upon the individual's life, but it is a matter whose determination lies solely with the student himself.

Fraternities.

Thus, there is need for student organizations in which those whose tastes and ideals are kindred may find companionship. It is this need which fraternities fill. In the University of Texas qualities of heart rather than qualities of mind, purse or birth are considered in the selection of members. Each fraternity may be distinctly characterized by the type of men it chooses, but a spirit of sympathy and helpfulness pervades all of the organizations.

The past year has been a most satisfactory one for the eleven active chapters in the University. Politics has been the absorbing activity of them all, and the criticism may be passed that the social and gentler features have been neglected in the somewhat unseemly pursuit of honors.

A most hopeful sign of the healthy condition of our Greekdom is the procuring of chapter houses by several of the fraternities, notably the Kappa Sigma, Phi Delta Theta, and Beta Theta Pi. The two latter have rented houses which their members will occupy next year, and this progressive movement sets an example which will no doubt in time be followed by the other fraternities.

E. T. M.

Hardly in the history of the University has the spirit of gratitude towards conquering combatants been so loudly and enthusiastically proclaimed as by the welcome given to the base ball team on its return from its trip, and to the victors in the Baylor debate. This year's base ball team, in spite of the reprimand that was sure to follow, received a welcome far more hearty than did the team of last year. Fully two-thirds of the students met them at the depot and escorted them to the Auditorium, headed by Besserer's band. On assembling in the hall the team as a body was forced by popular wish to mount the rostrum and seat themselves for an inspection. Scarcely were they seated when the cries of "Speech," "Taylor," and so on down the line, rang out simultaneously. Finally the crowd succeeded in persuading one of the bolder members to come forward and tell of his good time and his joy at being received by such a demonstrative body. Another ventured, and so on until all the members of the team had said something. President Prather, Judge Clark and several members of the Faculty were in turn called upon before the crowd felt that they had done all in their power to demonstrate their appreciation of the team's success.

Enthusiasm for Returning Conquerors.

Mr. Potts, the sole victor to return to us after the Baylor debate (Mr. Thomason, his colleague, having stopped off at home) was cheered just as roundly as the entire base ball team. Mr. Potts and Mr. Thomason, be-

sides having won laurels for this institution, have caused, by their efforts, the resuscitation of an art whose practice had almost ceased to interest the student body.

O. H. P.

* * *

The Decadence of the Social Spirit in the Classes.

At the same time this activity just noted must bring to the mind of every classman the prevalent lack of a spirit of class congeniality and sociableness. Especially is the senior class negligent of any attempt in this direction. Excepting an "at home" by the President, Mr. David Grove, this body has not met in a social gathering this year. This general inactivity may be attributed, perhaps correctly, to the petty differences which arise between the students when the time comes for a distribution of the different political honors bestowed by the student body. If such is the case, a spirit similar to that expressed by the astronomer-poet of Persia, Omar Khayyâm, in these lines:

"Come, fill the Cup, and in the Fire of Spring
The Winter Garment of Repentance fling:
The Bird of Time has but a little way
To fly—and Lo! the Bird is on the Wing."

O. H. P.

* * *

ATHLETICS.

The base ball team started the season with such prospects as are seldom seen. Seven of the championship team of last year returned with several more who had made close runs for positions on last year's team. Added to these were half a dozen fine players found among the new men, and numerous less skilled men eager to train. It was a foregone conclusion that the team would be exceptionally strong. The winter was mild and the weather opened for practice quite early.

In the games on the home grounds, the only ones witnessed by the writer, the individual work of the men was better than last year in almost every position, and the team as a whole was stronger; but the team work, the playing of the fine points, as in general backing and the general spirit of earnestness, were not up to last year's splendid standard. The absence of any rival college team able to give a close game makes it difficult to keep the men from getting careless at times. After defeating every team in the State bold enough to attempt a game with us, the team took an Eastern trip, playing with scores as follows:

University of Texas

vs.

Jefferson Military Institute	May 7,	8 to	3
Jefferson Military Institute	May 8,	7 to	7
University of Mississippi	May 9,	3 to	1
University of Mississippi	May 10,	9 to	0
Vanderbilt University	May 11,	3 to	2
Vanderbilt University	May 12,	4 to	14
University of the South	May 14,	3 to	2
University of the South	May 15,	3 to	4

To travel constantly and play eight games in succession is a severe strain, and that the team should have gained undisputed championship of the State, and then lost only two out of eight games against the best Southern teams is greatly to its credit.

It is, therefore, doubly unfortunate that the action of the team in another matter should have brought discredit upon itself and upon our University athletics. Early in the season it became known that several students who had failed all the year to keep up creditably with their academic work were promising candidates for the ball team. The President notified the coach that on account of not keeping up with their work two of the players could not be allowed to represent the University in intercollegiate athletics, as a Faculty regulation requires that a student shall not represent the University in intercollegiate athletics who has failed to pass satisfactorily on his required academic work. Three other men were warned that their record was also somewhat unsatisfactory, but that there was a possibility of their deficiencies being made good. The record of these students remained unsatisfactory, and the President forbade their going as members of the team on the Eastern trip. One of these players happened to be an exceptionally fine catcher, and in the excitement of the time some of the team agreed to pay his expenses and took him with them. Part of the men left here with the intention of playing this man, others merely desired, out of sympathy, to give him the trip as some compensation for his faithful training and his disappointment at being thrown out at the last hour. However, in the excitement of a close game with Jefferson, he was played, and all the team afterwards agreed to be held responsible, though several of the more thoughtful ones opposed playing this man against the President's orders.

As soon as it became known here that this student had gone with the team, a telegram was sent by the President, stating that the whole team would be held responsible if he was played. After the receipt of this telegram the manager did not allow him to play again. He had already played in the second Jefferson and first Mississippi games.

Upon their return the entire team was suspended for the rest of the term till examinations, reprimanded, and each member forbidden to represent the University in intercollegiate athletics for a year. As soon as the matter was put in its proper light before the students, the folly of such action by the team was thoroughly appreciated, and the student body, with the serious sentiment of the team itself, so thoroughly condemned their hasty, thoughtless and misguided action that severer punishment did not seem necessary. There was no evidence of the man having been taken with the deliberate purpose of attempting to override the President's authority, but it was done hastily and under excitement, and from too great a desire to win the championship for the University of Texas.

While the occurrence is much to be deplored, it will result finally in much good to athletics and the University. The notions left in the student mind by unfortunate circumstances in the past are eradicated, and all recognize now that our regulations will be rigidly enforced, that the primary object

of college athletics is not to win games, and that the University will tolerate nothing but clean and manly athletics by representative University men.

The better student sentiment supports heartily this position, and athletics will move forward another stride, even though temporarily crippled by losing our entire present base ball team for another year. There are plenty of other good men willing to train, and by faithful work an excellent team can and will be made.

* * *

The track athletic team this year was too badly handicapped to hope for any record. The entire attention of Coach Clark was given to the base ball team, and just at the critical part of the training season the breaking of the dam destroyed the small bathing facilities we formerly enjoyed, and practically closed the gymnasium. Messrs. Hildebrand, McMahon and Wiseman, who represented us in the meet of the Southern Intercollegiate Athletic Association, deserve great credit for having trained faithfully, as best they could without trainer, track, gymnasium, bathing facilities or training table. It is idle for Texas to hope to take any creditable stand in this branch of athletics until these necessities are provided.

* * *

The tennis committee has constructed five new courts on the campus, and substituted on all six of the association courts iron standards for the old unsightly wooden frames formerly used to support the back net. These make quite an improvement in the appearance of the campus, and will last indefinitely. The new plan of throwing the courts open free to every member of the University and furnishing a few club nets and rackets has had the desired effect of inducing a large number of students to take up this game. The courts have been very popular, and since the tournament a still greater interest is manifested by both men and women. The same plan will probably be continued next year. An inter-class tournament will be inaugurated in the fall, and the State tournament held on our courts in the spring.

The tournament was held May 9 to 12, and resulted as follows:

Ladies' singles, entries 2; winner, Miss Mary Key.
Ladies' doubles, entries 4; winners, Miss Key and Miss Fay.
Mixed doubles, entries 8; winners, George Wright and Miss Joynes.
Men's singles, entries 10; winner, Semp Russ.
Men's doubles, entries 8; winners, H. Key and E. E. Townes.
Beginners' singles, entries 16; winner, Jack Hubbard.
Beginners' doubles, entries 16; winners, Seth Searcy and O. Palm.

A. CASWELL ELLIS.

MEDICAL DEPARTMENT NOTES.

The following pleasant incidents connected with the Medical College Commencement may be mentioned:

The Regents were very hospitably entertained by the students with a good dinner at University Hall, June 10. The dinner was a good one, though they said that it was no better than their ordinary fare. The Hall is successfully managed by a committee appointed by the students. Good fare is furnished for about $9.50 per month.

* * *

On the night of the 11th a reception was given by the students at the University Hall. It was attended by students, Faculty, members of the Board of Regents and many of the citizens of Galveston. All the pleasures that could be desired on such an occasion were offered to the guests of the boys.

* * *

The Commencement exercises were held on the night of the 12th in the opera house, and were witnessed by a large and attentive audience. The "floral offerings" were presented after the graduates had returned to their seats from the stage. Dr. W. S. Carter, of the Medical Faculty, opened the exercises with an admirable address. His subject was the "Physician and Sanitation." As is always the case at the Medical College, the conferring of diplomas, under the direction of the Dean of the Medical Faculty, Dr. H. P. Cooke, was accomplished with commendable brevity—no dragging, no mistakes, and not a yawn in the entire audience. The graduates looked well in cap and gown. President Prather delivered the diplomas.

* * *

A banquet was given by the alumni at the Hotel Grand immediately after the closing of the ceremonies at the opera house. The following menu and lists of toasts will account for the fact that when midnight came many of the guests were still at the table:

MENU.

Shrimp Gumbo.

Olives. Salted Almonds. Celery.

Salt Water Trout.

Cucumbers. Potatoes.

Braised Sweetbreads. Sauterne.

Tenderloin of Beef, with Mushrooms.

Green Peas.

Broiled Spring Chicken.

Asparagus.

St. Juliene.

Strawberries. Vanila Ice Cream.

Assorted Cakes.

Roederer.

Cheese. Crackers.

Coffee.

TOASTS.

W. S. CARRUTHERS, M. D.,
Toast Master.

1. The University and the State.....President Wm. L. Prather.
2. The Medical Profession of Texas.....Dr. J. T. Wilson.
3. The Future of the University.....Maj. F. M. Spencer.
4. The Future of the Medical Department.....Prof. J. F. Y. Paine.
5. The Medical Alumni.....Dr. J. W. McGee.
6. Relationship of the Alumni to the University.....Dr. J. H. Ruhl.
7. The School of Pharmacy.....Prof. R. R. D. Cline.
8. The Pharmacy Alumni.....Mr. Conn L. Milburn.
9 The Ladies.....Prof. Wm. Keiller.
10. Our Benefactor, Geo. W. Brackenridge.....Dr. L. E. Magnenat.

* * *

Abstract of proceedings of the Board of Regents at their meeting in Galveston, May 10-12:

Mr. W. J. Townsend, LL. B., 1899, having lost his diploma by fire, it was ordered that he be furnished with a certified copy thereof.

The rule that no candidate for graduation shall receive his diploma unless he is present at Commencement, was relaxed on the petition of W. C. Dibrell, of the Engineering Department. Mr. Dibrell had completed the work necessary for his degree in the University, and was compelled to report by the first of June to the Geodetic Coast Survey in Washington, on which he has received an appointment. The same favor was granted to W. L. Barbee, of the Law School, who is a delegate from the University Y. M. C. A. to the Y. M. C. A. students' annual conference at Asheville, N. C., which convenes June 15th.

The Texas Federation of Women's Clubs sent in a petition asking for the establishment of a course in Library Science in the University. The petition was postponed for future consideration.

The Daughters of the Confederacy asked for a room in the University vault for storing documents, curios and relics. The board was compelled to decline the request on account of lack of room in the vault.

The committee appointed to count the vote for colors, James B. Clark, Secretary Board of Regents, J. W. Taylor, Senior Academic, and Alex Camp, Junior Law, reported said vote as follows:

Orange and white	562
Orange and maroon	310
Royal blue	203
Blue and crimson	11
Crimson	10
Irish green	2
Crimson and white	1
Old gold, maroon and peacock blue	1
Red, green and gold	1

Green	1
Orange and royal blue	1
White and maroon	1
Purple and old gold	1
Orange and cream	1
Orange and violet	1
Gold	1
White, orange and royal blue	1
Solid color with lone star of Texas flag	1
Orange	1
Total vote	1111

A majority of all the votes cast is 556. Orange and white received 562, six more than a majority.

Votes cast by alumni	409
Votes cast at Medical Department	148
Votes cast in Main University	554

The above report was received and adopted, and orange and white were declared to be the colors of the University of Texas.

* * *

The resignation of Miss Hannah Kindbom, as Superintendent of the Training School for Nurses, was accepted.

* * *

The action of the Dean of the Medical Department in appointing Miss Lenore Sayers, a graduate of the School of Nursing, to hold the examinations in place of Miss Kindbom was approved by the board; and Miss Sayers was authorized to sign the certificates of graduation of those who had completed the courses in the School for Nurses.

* * *

The appointment by the Dean of Miss Minnie Ferguson to supply temporarily the place of Miss Kindbom was approved.

* * *

The sum of three hundred dollars ($300) was appropriated to purchase supplies for a Marine Biological Laboratory at Galveston. In this work Dr. Wheeler, Professor of Zoology in the Main University, will be assisted by Dr. Allan J. Smith, of the Medical Faculty. Miss Augusta Rucker, the efficient instructor in Zoology, is working with them. The coast of Texas offers a very inviting field of discovery in this branch of knowledge, and it is to be hoped that the Legislature will recognize its value. Regent Brackenridge, always helpful at the right time, has placed his steam launch at the disposal of the conductors of the station.

* * *

The President made a verbal statement regarding the excellent work inaugurated by Dr. Bray, Professor of Botany, in the matter of Texas forestry.

Regents Gregory and Bryan were commissioned to attend, as representatives of the Board, the next Commencement exercises of the A. and M. College.

* * *

The following degrees and certificates were ordered to be conferred:

DOCTOR OF MEDICINE.

Allen, G. W., Jr.	Decherd, H. B.	Lackey, J. P.
Blailock, H. F.	Foster, John H.	Radkey, O. H.
Brown, B. S.	Gregg, Frank C.	Schaeffer, Charlotte M.
Bryan, T. F.	Griffin, J. E.	Spaulding, T. E.
Devlin, Ella.	Jackson, R. S.	Stertzing, Herbert F.
	Thornton, Z. N.	

GRADUATES IN PHARMACY.

Ball, M. Scales.	French, Guy T.	Perkins, John H.
Domingo, Emma C.	Gatewood, B. Elmer.	Reynolds, C. L.
English, David P.	James, Thomas Reece.	Smith, W. L.
Flavin, Henry J.	McCullough, Frank E.	

GRADUATES IN TRAINING SCHOOL FOR NURSES.

Bryan, Carolyn.	Dunklin, Marion.	Horton, Ada.
Champion, Winnie.	Ferguson, Minnie.	Rhodes, Ella.
Dirksen, Emilie.	Fitch, Anna Lee.	Smith, Sallie Will.

J. B. C.

* * *

THE ALUMNI.

The following report will be submitted to the Alumni Association at the regular business meeting on Tuesday, June 19:

AUSTIN, TEXAS, June 14, 1900.

Mr. Victor L. Brooks, President of the University of Texas Alumni Association, Austin, Texas.

DEAR SIR: At the last regular meeting of the Alumni Association, on June 13, 1899, provision was made for the establishment of one or more scholarships in the University of Texas, and, for the support of the same, it was provided:

Report of Committee on Scholarships.

1. That all money derived from the collection of annual dues (less $50.00, which shall be kept in the treasury) shall be divided each year into two equal parts.

2. One of these parts shall constitute a permanent scholarship fund, of which the interest shall be available for use in the same manner as the income from dues. It shall be invested as the association may direct.

3. The other part shall be awarded by competitive examination, in sums of one hundred dollars, to students entering the University for the first time.

A general committee was at the same time appointed to take this matter

in charge, to hold the necessary examinations, and award the scholarship (or scholarships) for 1899-1900, if advisable to do so, and to report detailed regulations at the next annual meeting. The committee begs leave to submit the following report:

I.

The committee decided to award the scholarship for 1899-1900 to the person standing the best entrance examination in English, History and Mathematics. The professors in charge of those subjects were appointed judges, and the scholarship was awarded to Conrad L. B. Schuddemagen, of the Gonzales High School. The Alumni Association is to be congratulated upon the high standing which Mr. Schuddemagen has taken since his entrance. His record during the first two terms of the year just closing shows the highest grade in all subjects but one for the first term, and in all subjects for the second term,—being the best record in the Freshman class.

As there was not sufficient money in the treasury to pay the $100.00 promised the holder of the scholarship, the committee opened a subscription with the object of raising the $100.00 in one-dollar sums. The response was most gratifying, and the desired amount was secured without difficulty. In fact, quite a number of persons contributed larger sums, which have been refunded after subtracting the one dollar. The following is the list of contributors:

B. M. Allen, Cleburne.
Jesse Andrews, Houston.
H. D. Ardrey, University.
J. R. Bailey, University.
Miss Lulu Bailey, University.
W. S. Bailey, Calvert.
W. G. Barber, San Marcos.
Eugene C. Barker, University.
W. D. Bates, Corsicana.
Prof. R. L. Batts, University.
H. Y. Benedict, University.
F. Berry, Houston.
Miss Daisy Bryan, Quintana.
T. P. Buffington, Anderson.
Lester G. Bugbee, University.
A. S. Burleson, Austin.
R. L. Caruthers, Sherman.
Miss Lilia M. Casis, University.
Miss Edith Clark, University.
J. M. Coleman, Houston.
R. E. Crawford, Mason.
W. J. Crawford, Beaumont.
Wilson Davidson, Santiago, Cuba.
Miss Vive De Lesdernier, Houston.
A. W. Denmark, Gonzales.
L. E. Dickson, University.
J. F. Etter, Sherman.
Miss Hattie Evans, Corpus Christi.
T. C. Ford, Houston.
J. L. Gammon, Waxahachie.
George P. Garrison, University.
Miss Shirley R. Green, Palestine.
T. W. Gregory, Austin.
W. W. Hair, Belton.
J. L. Halbert, Corsicana.
R. W. Hall, Vernon.
Miss Alma Harris, Mexia.
Miss Grace Harrison, Austin.
J. H. Hart, University.
Miss Mary Heard, University.
Ira P. Hildebrand, University.
Yancey W. Holmes, Gonzales.
S. H. Hopkins, Gonzales.
Miss Edith Hull, Houston.
W. S. Hunt, Houston.
F. C. Jones, Houston.
R. E. L. Knight, Dallas.
J. M. Kuehne, University.
Miss Roberta Lavender, Houston.
Miss Clifford Le Tellier, Sherman.

J. B. Lewright, Cuero.
John A. Lomax, University.
P. T. Lomax, Cleburne.
G. E. McCelvey, Temple.
J. S. McCelvey, Temple.
J. W. McClendon, Austin.
A. C. McDaniel, San Antonio.
J. H. McLean, Llano.
J. Y. McNutt, Calvert.
E. T. Moore, Jr., University.
S. M. Morris, Galveston.
J. C. Nagle, College Station.
F. R. Newton, San Antonio.
Denny Parker, University.
J. E. Pearce, Austin.
D. A .Penick, University.
J. K. Prather, Waco.
Miss Mary Lu Prather, Waco.
F. Reichman, Austin.
Miss Laura Reese, Gonzales.
W. S. Richardson, Oklahoma, Okla.
W. F. Robertson, Georgetown.
A. D. Sanford, Waco.
J. H. Seale, Ruliff.
J. W. Sellars, Cleburne.
Morris Sheppard, Texarkana.
F. E. Smith, University.
Miss Maude Smith, Houston.
Dr. M. M. Smith, Austin.
R. Waverly Smith, Galveston.
D. W. Spence, College Station.
W. H. Stacy, Austin.
Miss Ada Stone, Beaumont.
T. H. Stone, Houston.
J. J. Taff, Washington, D. C.
T. U. Taylor, University.
C. C. Thomas, Cotulla.
Miss Fannie Van Zandt, Ft. Worth.
F. H. Welch, Taylor.
F. T. West, University.
Miss Hattie Whitten, University.
L. S. Williams, Chicago, Ill.

II.

The committee believes that most members of the Alumni Association have always been willing to pay the one dollar per year assessed by the constitution; it also believes that this is especially true now since the dues so collected are to be devoted to the support of scholarships. Yet experience has shown that the inconvenience of sending such a small sum through the mails has led, and will continue to lead, to general neglect in the payment of dues. In order to obviate this difficulty and to secure prompt payment the cammittee issued a circular letter soliciting permission from each member of the association to collect dues by draft. The response to this circular has been fairly good, though it has not been nearly so general as was hoped. There are about 900 members of the association; have signed the slips authorizing the collection of dues by draft.

III.

The committee submits the following regulations relative to the award, etc., of the scholarship (or scholarships):

1. The value of each scholarship shall be $100.00; payment shall be made in two installments,—on the first of November and on the first of April.

2. If there is only one scholarship, it shall be awarded to the applicant for admission to the University who stands the best entrance examination in English, Mathematics and History; if there is more than one scholarship, the second shall be awarded to the applicant who stands the second best examination in the above subjects, the third to the applicant who stands the third best examination, etc., etc.

3. Persons who hold diplomas from approved high schools and others entitled to admission without examination may enter this competition.

4. Applicants for admission to the Academic, Engineering, Law and Medical Departments are admitted on the same terms to this competition.

5. All persons competing must stand either (1) the regular entrance examination which is held in each of the approved high schools in May, or (2) the regular entrance examination which is held in the University in September.

6. The professors of English, Mathematics, and History are requested to act as judges in this competition.

7. The permanent scholarship fund shall be invested by the association through the executive council.

8. All matters relative to the scholarship shall henceforth be under the management of the association through the executive council.

L. G. B.

Report of the Committee on Memorial Busts.

It would be disloyal to the alumni to doubt the success of the enterprise undertaken by the Alumni Association to present to the University marble busts of O. M. Roberts and Swante Palm; but it seems very difficult to gain for this matter the attention it deserves. The committee earnestly bespeak the attention of all friends of the University, but especially of all alumni, to the following report and appeal.

The busts have been returned by the marble worker in Berlin, and have been finished by the artist. As works of art they could not be surpassed; they will intrinsically grace and dignify the halls of the University, and will testify eloquently to the reality among us of the sentiment and spirit implied in a movement to commemorate our benefactors.

Everything is ready for the presentation in June to the University of these noble memorials—except the completion of the fund. Very little has been added to the fund since last June. At that date more than half of the required $1000 had been contributed, yet the fund has not yet reached the $600 mark. The committee has completed the first half payment ($500), according to contract, to cover the artist's outlay in Berlin and cost of transportation. Upwards of $400 ought to be contributed before the middle of June.

The committee places its chief reliance upon the State alumni to make good this deficiency. For the greater part of the amount already contributed has come from other friends of the University than its alumni; and it is a simple fact that the handful of alumni who have left the State have contributed, in response to the same circulars, not relatively, but in absolute amount, more than all the alumni in Texas (excluding those who are or have been officially connected with the University). It would seem, therefore, that something like a general response might now be expected from the Texas alumni.

Of course, *many*, not large, contributions is the true and proper aim in this movement; and nothing but the importance of making sure that the enterprise, once undertaken, should not miscarry, could justify the committee in not limiting contributions, say, to two or three dollars. In assuring the success of this movement, however, more than ordinary interest may well be taken by those who have the ability. For the significance of these memorials is deeper than any mere matter of compliment, nor should they be understood only as a due tribute of gratitude. The undertaking appeals to, and its execution will foster the spirit of generous civility which a university, as one of its finest effects, ought to engender in all who come within the sphere of its influence.

There is, also, a wider claim, in the case of Governor Roberts, upon all who are conversant with the history and concerned in the welfare of the State of Texas; nor could those who may be especially interested in the movement from this point of view select a fitter place to set up a memorial than the halls of the State University. The foundation, development, and immediate service of that institution constituted one of the most prominent motives in the life of Oran M. Roberts, and his title to grateful remembrance on the part of his fellow citizens rests no less upon that great merit than upon his formative influence in the jurisprudence and politics of this commonwealth.

There is still further the general appeal to all friends of art and culture as such; for the marble busts thus to be presented to the University are not of that mechanic style which has prevailed to such a distressing extent in the attempts to commemorate public benefactors in this State; but they are true works of art, of supreme excellence, by the hand of the sculptress, Elisabet Ney, whose portraitures perpetuate in European capitals the lineaments of a long list of notables in rank and genius. This artist has created also many works of the imagination of the first quality, but it is as the unexcelled portrait artist of the great men of her day that she is most famed.

One of the busts, it should be mentioned, is to be obtained without cost in the way of completion on the part of the artist of a donation made by her at the foundation of the University of Texas. On the occasion of the inauguration of the University she presented the plaster cast of a bust of Governor Roberts; and this fragile memorial (the fruit of personal friendship and esteem) she so much desired to see safe in imperishable marble, that she generously offered to execute this one of the busts without charge.

It should be stated that all contributions will be devoted intact to their avowed purpose, the Alumni Association having undertaken all charges incident to communication and collection. The Association has already borne a great expense in printing and mailing circulars, and it is hoped that each admirer of the men to be commemorated, each friend of art and culture, and particularly each alumnus of the University who reads this report, will read it in the light of a *personal appeal* and promptly make some contribution.

The busts, it is repeated, are to be presented to the University by the Alumni Association in the name of all who contribute.

Address any member of the committee (two of them resident in Austin and one in Victoria) for further information. Send cash contributions or subscriptions to the chairman, Arthur Lefevre, Victoria, Texas.

(Signed) ARTHUR LEFEVRE,
M. M. SMITH,
R. C. WALKER,
Committee.

The Summer Quarter of the University of Chicago for 1900 Begins July 1, and Ends September 21

THE University of Chicago divides the year into four quarters of equal academic importance. Thus, the Summer Quarter affords the student-teacher during vacation the very best opportunity to do thorough work. By summer work alone, the highest academic degrees may be obtained.

The many Open Lectures, delivered almost daily throughout the Summer Quarter, form one of the best series of popular and scientific lectures offered anywhere.

The attendance at the University increases year by year. The prospects now indicate for this summer the largest attendance in the history of the institution.

All students receive a hearty welcome. The Southern Club offers to render any service in its power to students from the South. The Texas Society, also, endeavors to make the residence of Texas students pleasant and profitable.

The necessary expenses for a full quarter are estimated at from $103.00 to $169.00. Last summer the Texas students secured a railroad rate of one fare for the round trip.

Mr. W. A. James, Galveston, Texas, is Secretary of the Texas Society of the University of Chicago. Address him for rates this year.

For Summer Quarterly Announcements, Open Lecture Circulars, or any information, address

The University of Chicago,

Chicago, Illinois.

THE TEXAS STATE HISTORICAL ASSOCIATION.

Organized March 2, 1897.

JOHN H. REAGAN, President.
GUY M. BRYAN, First Vice-President.
JULIA LEE SINKS, Second Vice-President.
F. R. LUBBOCK, Third Vice-President.
GEORGE P. GARRISON, Recording Secretary and Librarian.
LESTER G. BUGBEE, Corresponding Secretary and Treasurer.

THE OBJECTS OF THE ASSOCIATION,

as stated in its constitution, are "in general, the promotion of historical studies; and, in particular, the discovery, collection, preservation, and publication of historical material, especially such as relates to Texas."

THE QUARTERLY OF THE ASSOCIATION

is sent free to all members. The subscription price to others is two dollars per year, or fifty cents per number. The Quarterly is sent also to the principal libraries of the United States and Canada, and is exchanged for many other publications, principally such as are of a historical nature. It has obtained hearty commendation in many quarters. The numbers published during 1899, contained the Prison Journal of Stephen F. Austin, and much other matter of historical interest. Subsequent numbers will contain copies and translations of rare Spanish MSS., and other important documents.

THE COLLECTION OF THE ASSOCIATION

consists of about two hundred and fifty volumes and pamphlets, besides a considerable amount of MS. material and various historical relics, and is growing steadily. The Association has at present no means to buy such matter, but it will gladly receive, acknowledge, and preserve gifts for the collection.

MEMBERSHIP.

There are no qualifications for membership, except interest enough in the work of the Association to help support it by paying the dues, which are only two dollars per year, including subscription to the Quarterly. The number of members is now about one thousand, among whom are many of the most prominent citizens of the State, and a considerable list from without.

Those desiring to become members or subscribe for the Quarterly, should send their names to

LESTER G. BUGBEE,
Corresponding Secretary and Treasurer,
Austin, Texas.

Contributions for the Quarterly and correspondence relative to historical materials, should be addressed to

GEORGE P. GARRISON,
Recording Secretary and Librarian,
Austin, Texas.

MINERAL WELLS, TEXAS,

RAPIDY BECOMING THE

Greatest Watering Place in the South.

IT IS REACHED ONLY VIA THE

WEATHERFORD, MINERAL WELLS & NORTHWESTERN RAILWAY

Excursion Tickets on sale with all the principal roads of the State. All Santa Fe and Texas and Pacific trains make connection at Weatherford, Texas, for Mineral Wells.

For further particulars address
W. C. FORBESS,
General Passenger Agent,
Weatherford, Texas.

IF YOU WOULD TRAVEL

to the

EAST, NORTH or SOUTHEAST

in comfort, purchase your tickets via the

COTTON BELT ROUTE

The BEST TIME, the BEST SERVICE, and the BEST connections are assured.

The only line operating
PARLOR CAFÉ CARS
(meals a la carte).

Pullman Sleepers, Elegant Wide Vestibuled FREE Chair Cars.

THE BEST ROUTE

...TO...

Memphis, Louisville, Cincinnati, Nashville, Chattanooga, Atlanta, New York, Washington, Philadelphia, Baltimore, and other cities of the North, East and Southeast.

For maps, time tables and other information, write your nearest Cotton Belt Agent, or

S. G. WARNER, Gen'l Pass'r and Tkt. Agt., TYLER, TEX.

D. M. MORGAN, Traveling Pass'r Agent, FT. WORTH, TEX.