

CHAPTER SEVEN

TRIAL & ERROR

Adventures in Curriculum Making



CONFLICTING AIMS

All these weaknesses of the pioneer stage—hesitancy and inadequacy in state aid, incompetence and impermanence of the governing board, instability of the administration, and insecurity of the faculty—were due mainly to lack of definite determination and agreement as to just what the College was and for what and for whom it existed. Like those of other land-grant institutions, Iowa A. and M. officials and constituency were divided into the narrow-gauge practical agricultural school supporters and the broad-gauge technologists. The former group had the advantage of the precedent and tradition of the act of 1858, which had not been specifically altered by the act of 1862 accepting the federal grant, whereas the more liberal elements could maintain that the letter and spirit of the grant act required their type of institution. President Welch endeavored to mediate between the two extremes, but by his training and experience he found himself eventually more closely identified with the liberal group.

“The friction between manual and mental labor is constantly diminishing, and the whole enterprise is gradually but surely gaining in efficiency and completeness,” was his hopeful report in 1873. But the friction increased rather than diminished, and the administration was conscious of a continuing need for defense. In an address before the State Horticultural Society on January 20, 1875, he explained at length that the College was maintaining a program in full

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harmony with the law. Agriculture and mechanic arts developed in co-ordinate position were given the major emphasis, and seven-eighths of the studies "related to" these vocations. The classics were not taught, and the general subjects were those which were essential to every well-trained person. That the institution was ministering to the element for whom the grant was designed was proved by the fact that thus far three-fourths of the students had come from farm homes, and four-fifths could be identified with the industrial classes.

In a rather elaborate paper on "The True Work of the National Industrial School" read at the National Agricultural Congress of the Centennial Exposition in September, 1876, and presented again in November at Chicago before the convention of Presidents of the State Universities and Agricultural Colleges in the West, he frankly stated his belief that the training of specialists in particular branches of agriculture was of much greater service to a state than the educating of young men for the practical conduct of farms.

Finally in an address before the State Horticultural Society in 1881 on "Science with Practice in Education" he set forth his "own educational creed," which was "simple, straightforward, and well defined." With ultra-modern emphasis he would educate for vocational competence and social participation. He would adjust a student's curriculum "by an inventory, if possible, of the things he will do hereafter, both in a chosen vocation and under his inevitable obligations as a citizen and a man." He would go to the length of opposing any study "whose practical application to the purposes of life cannot be definitely and clearly stated. . . . Learning and culture, however deep and wide, are valueless except as they become active, and contribute directly or indirectly to supply the wants of the world." The agricultural college, "while admitting sparingly those studies which fit the man for his influence and the citizen for his duties," should organize in "judicious proportion those branches which are adapted to

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make the adept and the master workman, or if I may publicly allude to workers who are still young, to make men such as [William K.] Robbins ['78], in agricultural chemistry; [Fremon't] Turner ['79], in mechanics; Professor [Charles F.] Mount ['78], in civil engineering; Dr. [Millikan] Stalker ['73], in veterinary science; as Herbert Osborn ['79], in entomology; or the two Beards [Edward L., '73, Lewis W., '76], in general farming." In short, while trained artisans existed in adequate numbers, the great need of the age, as he saw it, was for applied scientists.

So socially enlightened an aim and program did not satisfy the old-line industrialists who, regardless of reality, sought the training of practical farmers whether or not they would return to the paternal acres or could secure new farms. Farmers' organizations generally advocated such a class-conscious institution, and the agricultural press led or followed the sentiment. The board and faculty were divided on the issue which contributed directly to Dr. Welch's removal in 1883.

PURPOSE REDEFINED

This extreme partisan action brought a counter stroke from the liberal camp. On March 20, 1884, during the same session at which the board had been reorganized, the code provision for the course of study was repealed and a substitute adopted by unanimous vote in the Senate and with only four opponents in the House, providing that there should be "adopted and taught at the state agricultural college a broad, liberal and practical course of study in which the leading branches of learning shall relate to agriculture and the mechanic arts, and which shall also embrace such other branches of learning as will most practically and liberally educate the agricultural and industrial classes in the several pursuits and professions of life including military tactics." The act, which in effect meant the replacement of the continuing statement of the act of 1858 by the more liberal provision of the Morrill Act, was

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the work of Senator Preston M. Sutton of Marshalltown, a graduate of the Illinois Normal University, who had had an extensive teaching career in Iowa schools and colleges before reading law. In defense of the change Sutton made an extended and impassioned plea in which he argued that the intent of the federal law had been defeated by the continuation of the narrow program of the Agricultural College which had inherited the grant, and that the true purpose and intent of the national agreement could only be met by a provision for broad, liberal training in which literature and the several sciences, including the social, had a prominent place.

In support of his contention Sutton through a telegram to Senator Allison received a statement from Morrill which, with characteristic qualifications and reservations, bore out essentially his claims. The law of 1862, Morrill explained, "was intended to apply to states where the colleges would have large funds as well as those having very small sums, and it was intended also that a considerable prominence should be given to the practical sciences, such as are related to agriculture, chemistry, botany, etc., but it was not intended to limit the amount of education in any way so as to prevent a college from having the means and the efficiency of even a university as to languages and mathematics." The state press gave much prominence to the debate and the act, and the college paper printed Sutton's speech in full. "This speech of Mr. Sutton's," the *Ames Intelligencer* asserted, "is the most noted plea for colleges of this class that has ever been put forward in any of the states; and Mr. Sutton himself has secured by it an abiding place in the hearts of all the students, alumni and friends of the Iowa State College henceforth and forever."

ENTRANCE REQUIREMENTS

With this liberalizing statute there remained in practice the conditioning limitations to the forming and functioning of a well-balanced curriculum. To begin with, there was the

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inadequate preparation of the available students. In Iowa, as in other parts of the West under pressure of sectarian, social, and reform zeal, College enrollment outran provision for secondary schools. The land-grant colleges as popular state institutions were compelled to adjust their entrance requirements in number of subjects, and too often in subject mastery, to the program and standards of the public schools. The college curriculum had to be built upon this very elemental and often unsubstantial foundation. The first class, as noted, was examined in elementary subjects. The following year algebra through simple equations was added to the subjects of examination, and during the eighties history and human physiology were included. Specimen questions were printed in the yearly statements and catalogues for many years—"only specimens" to show "*average* character." The questions reflected interests and emphasis in teaching. The catch words of spelling contests (all but phthisis, daguerreotype, and phlox, which were perhaps too notorious to afford ample test) were offered. Grammatical rules and forms rather than ease and clarity of expression were emphasized. Literary selections were chosen for parsing and analyzing rather than for identification and interpretation. Geography stressed relative statistics and locations, routes of voyages, and such provocative suggestions as "the geographical advantages of St. Louis for a great city." Arithmetic combined partial payments with proportion and square and cube roots. To 1876 deficient students were listed optimistically as "not fully accepted as freshmen." In that year for "the purpose of securing a better preparation for College classes" the Board provided a preparatory department in which a limited number were to be instructed by the regular staff in elocution, English grammar, analysis, physical geography, elementary drawing, higher arithmetic, elementary algebra, and elementary geometry. The "sub-freshmen" work was abandoned in 1887 for the negative reasons, as reported by President Chamberlain, of lack of dormitory space, recita-

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tion rooms, and teaching force and in the hopeful "belief that the graded schools in many villages of considerable size can do this preparatory work nearer home though perhaps not so well." This hope, even with its qualification, proved premature, and the following year a half-year's preparatory course was re-established on petition of the staff alleging "that such preparatory work would more closely unite the College to the country schools from which it draws the great bulk of its students; that it would enable the faculty to be more strict in enforcing the requirements for admission to the freshmen class and thus raise the standard of the college work; and that such preparatory course could be conducted without great additional expense to the College." In 1879 provision had been made for admission on certificate of examination from county superintendents and high school principals, subject to possible re-examination in certain subjects. In 1889 the first list of accredited schools from which graduates might be admitted on certificate was printed in the catalogue. The list, no doubt very liberal, included eighty-five high schools and eleven academies, seminaries, and institutes.

Curriculum making, always a sufficiently difficult task, was made increasingly so by this inadequacy of student preparation and the lack of established precedent and tried experience. The organizing committee had made certain suggestions, largely on the basis of the course of the Michigan Agricultural College, but an adaptable program remained to be worked out by the first staff. One of the deposed professors in 1874 charged that the President had regarded the making of the course of study as his particular prerogative, but later certainly he was glad to share this task and responsibility with a committee and the faculty as a whole.

INITIAL CURRICULUM

The first "course of study" was a rather desperate attempt to meet legal requirements on a collegiate level with the

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facilities available. The work was divided into two "departments" (curricula), agriculture and mechanic arts, the work of which was identical during the first one and one-half years. The selection of subjects indicates the prevailing state of application of the general sciences and the lack of development of the leading technical branches. "Mechanic arts" was made to cover the supposed essentials in both the mechanical and civil fields. Certain courses in social science and philosophy were required; and the optional offerings included the cultural studies that the grant act allowed.

The next two decades were marked by constant experimenting in curriculum making, both in subject emphasis and in organization. In 1877 there was a general revision by which the main courses were organized under special faculties with a chairman in charge of each course. From 1879 to 1886 the term "school" was substituted for department, and the heads of the special faculties were termed deans in the course descriptions though they were given no such title in their appointments or in official catalogue listing.

AGRICULTURE SEEKS PROFESSIONAL STATUS

As in all the land-grant colleges, the agricultural work which had been the primary motive in the founding of the College was the slowest to become established. Dr. Townshend in his single year of service taught geography, botany, and physiology. For one year as farm superintendent and two as professor of agriculture, I. P. Roberts gave practical courses in livestock and farm crops. Upon Roberts' retirement in the year of changes, 1873, one of his students, a graduate of the class of 1873, of maturity and unusual promise, Millikan Stalker, was elected his successor as farm superintendent and assistant professor of agriculture. Stalker's interest developed in the new field of veterinary science. He took courses at the New York and Toronto veterinary schools and secured the V.S. degree from the latter in 1877.

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For the spring term of that year a man of wider agricultural interest was secured for the chair of "practical agriculture." George E. Morrow of Illinois, after law training at the University of Michigan and active war service, had gained recognition as a successful farmer and an influential agricultural editor and lecturer. His ability and adaptability offered assurance that the man had been found for the key professorship. The official *Progressive Farmer* reported that Morrow had been recommended with "singular unanimity" and felt that no one "ever embarked in a difficult enterprise with so universal a confidence on the part of the public that he would achieve success." This feeling was justified by his later career elsewhere, but his service in Iowa was of the briefest. In November he accepted an invitation to the Illinois Industrial University with the explanation that he was more familiar with Illinois agriculture and felt that he could work there more effectively. The social and material considerations were probably no less determining: "The University is so situated that I can receive better school facilities for my little children and more convenient and desirable arrangements for a home. It would be a foolish affectation to pretend that an increase of salary had not also some influence."

For the next three years Stalker served as professor of agriculture and veterinary science, and there was a lessened emphasis upon the technical agricultural work. From 1877 to 1880 the general course of "sciences related to agriculture" superseded the more practical curriculum. This course, which emphasized the general sciences more than their applications, aimed "to make scientists in the branches which underlie agriculture" and "to prepare students who desire it, for scientific farming." To 1880 the bachelor of science degree was conferred on agricultural graduates.

With the coming of S. A. Knapp in 1880 a full agricultural course including instruction in dairying was provided, leading to the degree of bachelor of scientific agriculture (B.S.A.).

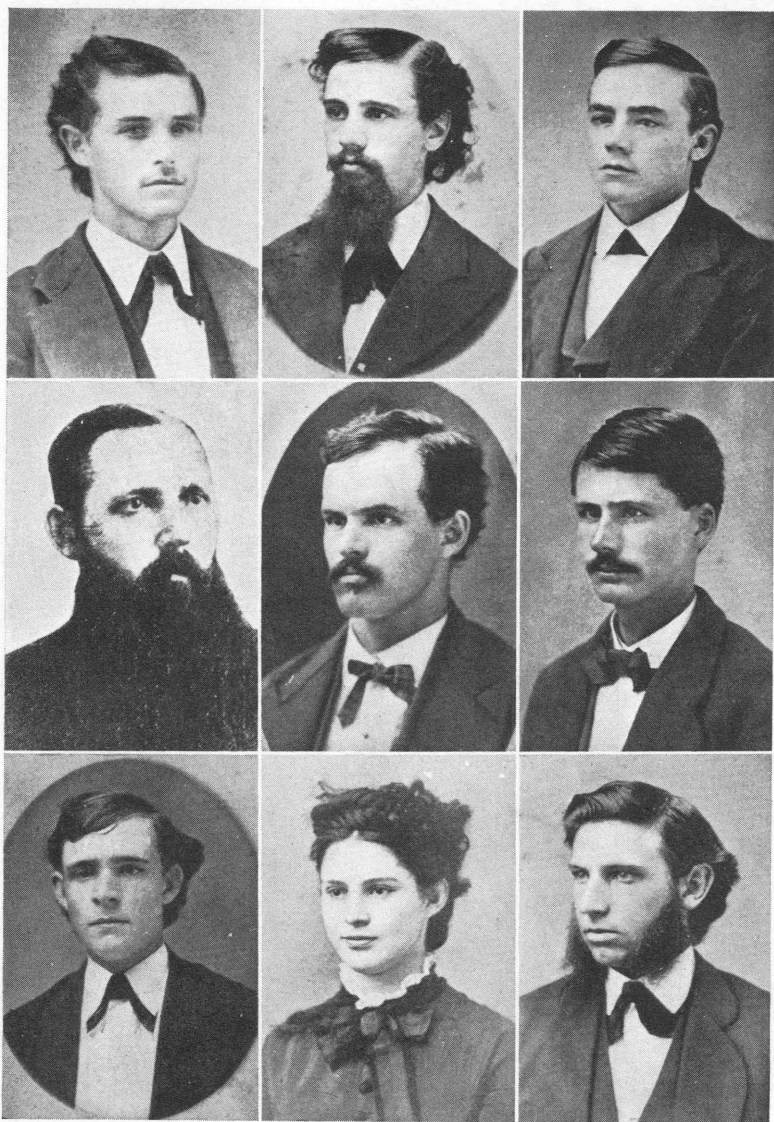
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Three candidates received this degree in 1883—George W. Curtis, who served for the next ten years as professor of agriculture at the Texas Agricultural College; Charles H. Kegley, who turned to law and real estate; and Herman Knapp, whose service to the College was to continue until his death half a century later. Upon S. A. Knapp's resignation in 1886, Herman Knapp was placed in charge. He had been elected treasurer and land agent in 1887 and carried on the teaching work merely on a temporary basis. President Chamberlain gave lectures in practical agriculture and supervised the farm until the selection of a regular head in 1889.

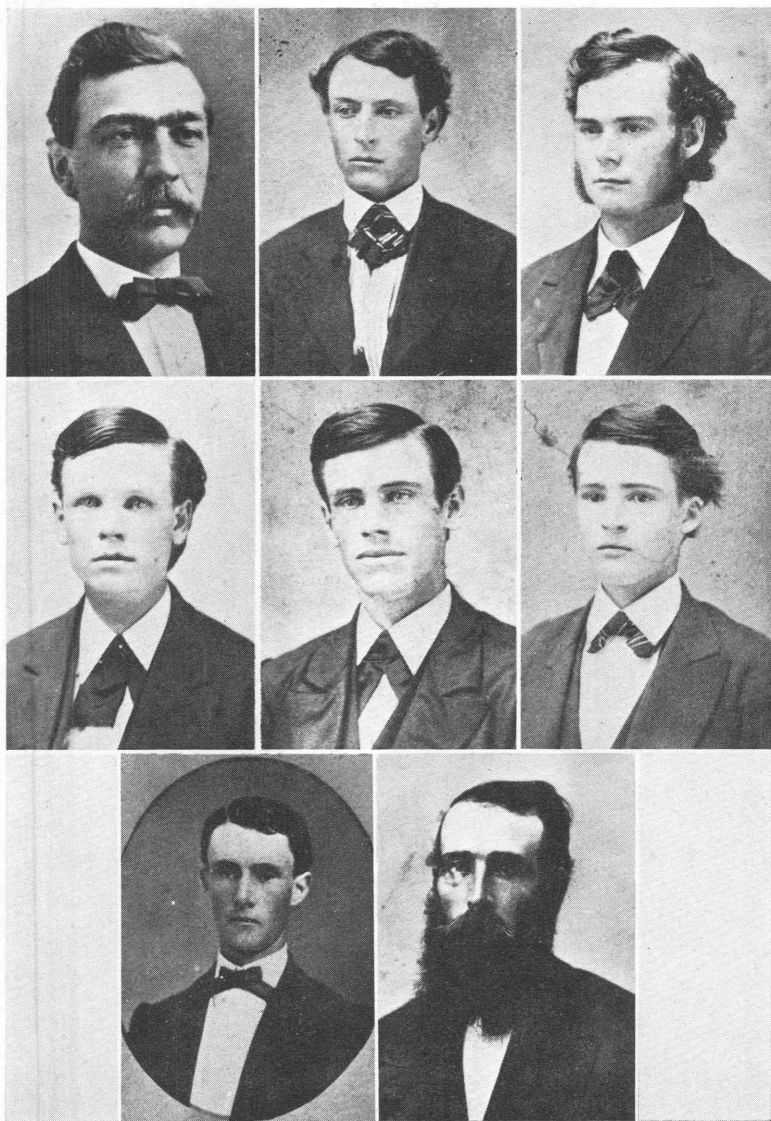
The selection of a permanent successor to the elder Knapp who would maintain and promote a real agricultural course proved a problem beyond immediate solution. At the May, 1887 meeting of the Board, Captain R. P. Speer reported for the committee that they had corresponded with Bessey of Nebraska, Sturtevant of the New York Experiment Station, Henry of Wisconsin, and Johnson of Connecticut, none of whom could suggest a suitable candidate. Professor E. M. Shelton of Kansas had declined an offer. Speer, who was to be the first director of the experiment station, had come to the conclusion that too much was expected of one professor—to supervise experiments and superintend the farm in addition to his teaching. He believed that two professors should be employed, one a specialist in farm crops and the other in animal husbandry. He had secured from Professor Roberts of Cornell the names of two graduates of that institution qualified for these positions and he recommended their election as associate professors. Such appointments, Speer suggested, would enable the College to dispense with the services of the existing professor of zoology and entomology. Just how it would do so was not made clear. President Chamberlain dissented vigorously from the recommendation and held that it went beyond the committee's jurisdiction. After interviewing the two candidates in question he had found one of them



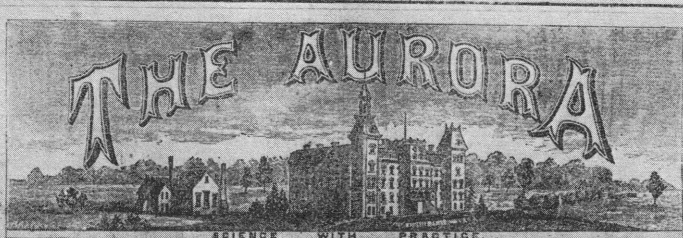
FIRST CLASS. *Left to right: At top*—Charles N. Dietz, F. L. Harvey, and Harry Fuller. *At middle*—Laverne W. Noyes, T. L. Thompson, and E. M. Hungerford. *At bottom*—C. P. Wellman, J. C. Arthur, and Fannie (Richards) Stanley.



FIRST CLASS (Continued). *Left to right: At top*—S. H. Dickey, J. L. Stevens, and Edgar W. Stanton. *At middle*—G. W. Ramsey, J. K. Macomber, and C. H. Tillotson. *At bottom*—C. A. Smith, Mattie (Locke) Macomber, and S. A. Churchill.



FIRST CLASS (Continued). *Left to right: At top*—C. L. Suksdorf, Henry L. Page, and Orange Howard Cessna. *At middle*—Luther Foster, John M. Wells, and I. W. Smith. *At bottom*—H. C. Spencer and P. S. Brown.



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THE AMERICAN INTELLIGENCER,
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THE LIST OF THE THIRTIETH.
An Oration delivered by a Member
of the Junior Class.

In the history of every nation, in every age, there appear great luminaries of mind that are to the intellectual and political world, what the sun, moon and stars are to the physical—though known as more as fiery characters, yet their memories still gladden in the hearts, soothe and direct nations. Five centuries ago there rolled above the city of the Caesars an orb, whose transcendent brilliancy illumined the earth, and made fair to revere Italy, was all Europe. In those days, when the Italian cities, Florence, Venice and Milan, were rapidly advancing beyond the other States of Europe in art and civilization, Rome neither could—nor, in law, no government, none of the features that ever gave an intelligent, free, powerful and happy people; however, her sons gladdened frequently manifested a desire for liberty, and with enthusiastic demonstration and desperate conflict, sought to maintain the title their city had been given of "the Eternal City." The name of Rome was known, but the office was filled by men appointed by the Pope, or elected by the nobles, never considered to one who was not of royal birth. Thus corrupted were the powers of the common people, and they lived unprotected, driven either east or west by the will which they had no voice in selecting. Hence in their ferocious, armed by soldiers, henchmen of the great company, who only ruled for the moment, a special task to absorb their sword in plebeian blood. They constituted the mighty governing arm that favored the rich, and oppressed the poor.

Rome's commerce had been killed to sleep by the waters of a troubled sea; her mercantile houses closed, her business in her streets was the middle of the web, and the clangor of arms, and, as the sword in her approaching destruction, which she met with a determined and unflinching.

Such was Rome, when Rince wiped the blood of a brother fellow, by a knight's sword, from the battle, and arose that vengeance upon the institution of his native city, her home, and all her recovered lands. Never in the history of mankind did so many operations and noble purposes find the will of man than when he met in a solemn council with his study felt, laws, and urged with a will and elo-

quence which allow no bounds, a change in the affairs of state, or when he dared to mount the rostrum in the capitol, and plead for a reform, restoration and reformation; these boldly hurt the gaze of darkness into the teeth of horror and of twilight. He it was, who, without regard to the force of an ideal or a column, and in the midst of robbers, traitors, turgid and death, framed a model resolution for the world. The tenth day from the murder shall witness the restoration of Rome—on condition expressed, no contingent implied. From this one night torn of untold sorrow, as iron will, pure patriotism and strict fidelity to the interests of a people to whose cause he enlisted body and soul. Up on the eve of the tenth day, three stream lights from the windows of a castle, in a wall had been deserted for more than fifty years; thence were raised murderers, and stand alone in their midst, taking the oath and sealing it with blood that dripped from his own right arm. Each of the one hundred warriors came forth, established a fealty with the laws of the compact, and said to his own swording in the custom. The clouds of night were fast gliding from the heavens, a few lingering stars still glimmered in the western sky, as through the streets of Rome there rode a solitary horseman, finding his bugle. Quickly, as if Gabriel had sounded the trumpet, there sprang from the haunts of the secret hills, twenty thousand Roman prepared to battle for the restoration of law, liberty, and Rome, and as many more, with equal quickness, and from the struggle of nobles with arms of steel, flaming banners, and fiery steeds, and gathered with the speed of the wind at the city walls, to hear down as easy ray their freedom, bring free.

The day passed by, hour upon hour, the contest was fierce; meet to sword, and hand to hand; but ere the last beams of the setting sun had glided the waters of the Tiber, Rome was restored—her people free.

A frantic populace assembled round the capitol building, exulting that watched, and their battle cry "Rome and the people." Thus, born in a day and carried upon the shoulders of plebeians to the Tribune seat, and passed of the night, he averted it with a will and with elation. Once more could turn Romans for the fast moulding, eager centers of their fathers with strong hopes of returning to Rome, the beauty and the glory of her institutions now fallen.

For months there perished such hero, as Rome had not known for years, and had her people been willing to salute to a slight taxation, all would have continued as merry as a marriage bell, and instead of standing where she stood today, among the nations of the earth, she might have stood upon of glory and queen of governments.

Rince, here is a day—like the had that blooms in a single day, with the preceding sun to fade away—he is a power and state; but for a season, for a day, he was in ever-eveiling Providence that had fore-ordained the triumph of his triumph should be the monument of his defeat. Down, down he went, only to the night.

After suffering the horrors of the dungeon for weeks, and the effects of the sword for years, he was removed to the prison of Rome. Again he rode triumphantly in his gait. Again were still the clouds of ten thousand years—the clasp of ten thousand swords—Agas did the clasp of ten thousand swords, and the clasp of ten thousand swords of harmony and unity, that rose louder and higher until each of the seven hills gave birth to a echo of echoes. Rince, conqueror of Rome. The banquet hall was spread, and guests came to his name from every corner till they were maid and mistress, knight and squire, and all the blood that dripped from his own right arm. Each of the one hundred warriors came forth, established a fealty with the laws of the compact, and said to his own swording in the custom. The clouds of night were fast gliding from the heavens, a few lingering stars still glimmered in the western sky, as through the streets of Rome there rode a solitary horseman, finding his bugle. Quickly, as if Gabriel had sounded the trumpet, there sprang from the haunts of the secret hills, twenty thousand Roman prepared to battle for the restoration of law, liberty, and Rome, and as many more, with equal quickness, and from the struggle of nobles with arms of steel, flaming banners, and fiery steeds, and gathered with the speed of the wind at the city walls, to hear down as easy ray their freedom, bring free.

Time rolled on. The light of the day broke from the chambers of the East, an arrow was in the streets, no martial array or war-horse there was seen or heard; instead soldiers, broad-edged, but only an instant; for there sprang a host of gleaming swords and gleaming helmets borne by traitors to the Senator, traitors who, like hands upon the thief's track, were bent upon blood. His friends cried "Rice!" but that determination of mind which had previously led to the restoration of Rome would not yield for well did he imagine that with his fight, or his death, down would go Rome, Italy, liberty, justice, and civilization into the depths from which he had rescued them. Not otherwise, or money, could they the fury of the mob. "Down with the traitor to the people" was the cry, and the fell led to the heart by the dagger of an elf-fired and a bite for. Thus, he wound his way through battle and through battle, to his own funeral pyre, and the bronze Lion of David that had kept constant vigil over the seven-hilled diadem of Italy for centuries, and emblem at the gates of Rome, as he first entered the Forum of Rince, now enshroued at the entrance of Rome's last Tribune, for with the champion of freedom, all that was noble, and much that was ignoble, found a grave. The solemn bell was broken, the laurels ceased to bloom, but a sword, like a meteor, into the heavens, and stood on, and still on, until the grand constellation of greatness, defied the theory of time and law, and he, the old nations, through the noise of error and forever.

The Harvard Freshman class numbered 127.

JUNIOR EXHIBITION.

Synopsis of Exercises.

Friday evening, the 14th, and 25th, being so fortunate as to be present at the exhibition of the Junior class of our College, we present our friends and readers a brief synopsis of the interesting proceedings.

The class, numbering twenty-six, around wide-awake students, is divided into three divisions, so that each portion could on a stage exercise every three weeks, and has the interest to collect, arrange and commit their thoughts upon subjects as diversified as the ingenious brains of Young America can invent.

SECTION FIRST.

The exercises were opened by an address from the college choir, after which C. D. Boardman delivered an oration, subject: "A National Seal." Mr. Boardman proceeded, in quite an interesting way, to prove that the art or method of reconstruction was too little considered by young people at the present day, and that experience, from this neglect, was often purchased at a very dear rate in our history. Ninety-seven per cent of our business failures, were attributed in his estimation, to the lack of scientific instruction in this particular. All could not become rich, but the masses might greatly better their condition and place themselves in higher positions of usefulness.

Lessons from the Bible. H. O. Duggan told us how three might be made of great service, in accumulating as much motives for noble action. Starting facts were often revealed and the loftiest sentimentation evoked by the contemplation of the doings of others. As was very natural, Mr. D. paid glowing tribute to the heroic struggles and self-sacrifices of Washington, the father of our country; to Franklin as being the great philosopher of modern times; and to Daniel Webster, the eminent statesman and constitutional expounder.

He graphically portrayed, the contrast existing between prosperous Germany and bankrupt and superstitious France. Thought our nation might well envy the victims of the one and shun the victims of the other. Scientifically, the True Model of "Blossoming." From this topic, R. V. Yates gave us a very interesting and well-considered speech. In his opinion, originally should stamp itself upon the actions of every true thinker, and in the attainment of true scholarship, the student should reflect all things to a slow and carefully chosen of reasoning, which should be a only deep, deep power of the mind, but true to the perspective the theories of modern investigators. To many play the investigations of science, a superficial glance and then hastily accept or reject his conclusions as the popular will may

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wholly unacceptable. In any case he felt that it would be a mistake to divide the professorship.

Shelton of Kansas was the President's choice, and he had assurance that the professor could be induced to accept. He therefore recommended a salary of \$1,800 as professor, \$500 as superintendent, and a house. The election was made on that basis. In the *Students Farm Journal* for July Chamberlain wrote that when Shelton visited the College that month they expected to persuade him that for the remainder of his professional life he could do more good in Iowa than in Kansas. "Practically and scientifically," in his judgment, this professor stood "about at the head of a most honorable list of professors of agriculture." The hope of such leadership for the basic department proved vain; neither material inducements nor professional opportunities could attract the promising candidate, as a Kansas City paper derisively reported: "Prof. E. M. Shelton has been unanimously elected to the professorship of agriculture in the Iowa Agricultural College at a salary of \$2,300 a year, with a big house, Jersey cow, a saddle-mule, yellow bull dog and latest devised corn-crusher thrown in as inducements for him to come there. Kansas cannot spare such men as Shelton yet awhile and he will continue to be a citizen of the Jayhawk State." Instead of the President's avowed choice the more acceptable of the committee's nominees, Loren P. Smith of New York, was chosen.

Under the new leadership there was a return to a general course under the title "science and agriculture" with the B.Sc. degree. In justification of a general science approach and emphasis for professional training, certain propositions, some of which were highly provocative, were laid down in the catalogue statement: "(1) That it is native ability that makes the successful man in any line of work, regardless of education. (2) That any education is a *help* to a farmer. (3) That a man may be perfectly successful on the farm after a thorough training in any line, classical, scientific, or technical. (4) That,

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from a lack of business ability, a man may fail as a farmer after the best college training in Agriculture; education makes more effective, but cannot *change* the powers of mind which nature has given. (5) That the best years of life for College work are also the best years for acquiring a business knowledge and training; and, on that account, the college graduate is at a disadvantage, when first entering active life, unless he has associated his college work with his later occupation. With these facts in view, the purpose of the Course in Agriculture is to furnish, to those who wish to be farmers in the best sense, an opportunity to acquaint themselves with some of the many scientific questions which their daily work brings forcibly before them; to enlist their efforts in working out problems yet unsolved; and, by a study of the applications of scientific truth in daily practice, to deepen and make enduring that intelligent interest in their work which makes the difference between delight and drudgery in the performance of any labor." Such a seemingly cavalier disregard of practical occupational training, reflecting the attitude of the general science rather than the technical student, was to contribute directly to the revolt of farmer organizations against the Chamberlain administration.

HORTICULTURAL FOUNDATIONS

Because of its importance for the new state and the early formation of an energetic society, horticulture, including pomology and elementary forestry, was recognized from the beginning as a study separate from but closely allied to general agriculture. Specialists in this field who combined scientific training, practical experience, and teaching ability were even harder to find than professors of "practical agriculture." Captain Mathews' work was restricted to pomology; the horticulture was joined to botany under Bessey. For three years, 1874-1876, Henry H. McAfee, a practical fruit grower with extended experience in Illinois and Iowa, had a professorship

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of "horticulture and forestry." During these first eight years the work was on an essentially artisan basis—dealing with the technique of production, grafting, budding, pruning, and other practical matters, but in 1877 the department was put on a scientific and professional basis.

The selection in that year of the secretary of the State Horticultural Society, Joseph Lancaster Budd, as professor of horticulture brought to the service of the College one of the great pioneer horticulturists of the nation and one of the most dependable members of the early staff. Budd was born at Peekskill, New York, and received his education at the state normal school and, for two years, at Union College. After teaching in the academy at Rockford, Illinois, he came to Shellsburg, Benton County, where he established orchards and nurseries. He was a founder, and for seventeen years secretary, of the Iowa Horticultural Society. His twenty-two years of service at the College, 1877–1898, saw his department and the institution in general well through the pioneer period.

VETERINARY SCIENCE BECOMES A DEGREE COURSE

In a state in which stock raising had so prominent a place, veterinary science early developed as a distinct curriculum. During the fall term of 1872 the German veterinarian, Dr. Henry J. Detmers, came from the University of Illinois as professor of veterinary science and gave well-organized and able lectures to the senior class in pathology, anatomy, and physiology. For some reason not indicated, however, his appointment was "recalled" at the December meeting, and his brief tenure was thus terminated. Detmers had pronounced and unyielding opinions, personal and professional, which led later to the unhappy termination of his service at the Kansas Agricultural College and the State University of Ohio. The next instruction was given in 1877, when Professor Stalker, after a year's study at the New York College of Veterinary Surgeons and the Toronto Veterinary College, offered

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throughout the senior year of the combined agricultural and veterinary course a five-hour survey of the "study and practice of veterinary science"—anatomy, physiology, materia medica, pathology, surgery, sanitation, and practice.

In May, 1879, the Board authorized a two-year course leading to a diploma. Since in that year the practice was started of renaming the leading departments "schools," a school of veterinary science was started. This was the first state curriculum in veterinary science leading to a degree. From 1879 to 1886 the course was for two years; in 1887 it was extended to three. To 1883 the degree of bachelor of veterinary medicine (B.V.M.) was conferred as a first degree, with the doctor's degree (D.V.M.) awarded to students with a B.S. After 1883 the D.V.M. became the only first degree. With the organization of the school, David S. Fairchild, M.D., a graduate of the Albany Medical College who had come to Ames as a practicing physician in 1872 and had been elected college physician in 1877, was made professor of histology, pathology, and therapeutics, to which expansive chair anatomy was added in 1882. Professor Stalker and Dr. Fairchild carried the bulk of the technical work to the early nineties.

ENGINEERING BEGINS TO SPECIALIZE

Engineering in these years developed its main lines with increasing specialization. From the rather indefinite "mechanical" course, the main branches were emerging by the third biennium. In 1873, following the retirement of Professor Anthony from physics and mechanics, Alexander Thomson, a graduate of the University of Michigan, became professor of mechanical engineering and superintendent of the workshop. While the latter dignity seems to have constituted his main interest, his efforts resulted in a fully established department when he retired at the end of 1884 to enter industrial employment. His successor, Norman C. Bassett, a graduate of Worcester Polytechnic Institute, went the same way after a

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couple of years (1885-87). C. W. Scribner, a young graduate of Princeton and of Stevens Institute, served out the decade. From 1871 to the general revision of 1877, courses in mining engineering and in architecture were listed. Both were identical with mechanical engineering for the first three years, the special work all coming in the senior year.

Professor Jones was followed in his amorphous department by Albert H. Porter, a graduate of Dartmouth College and of the Thayer School of Science who had had experience in the United States coast survey. He headed the combined mathematics and civil engineering work for two years (1874-76), when civil engineering became a separate department under Foster E. L. Beal, an M. I. T. graduate who came from teaching in the Naval Academy. In 1880 Beal was transferred to administrative duties, and Charles F. Mount, a recent graduate (B.C.E., 1878, C.E., 1879) only twenty-two years of age, was put in charge and continued until 1890, when he, too, sought more congenial professional and business occupations.

The bachelor of science degree was awarded in the engineering courses until 1878, when the more distinctive degrees of bachelor of civil engineering (B.C.E.) and bachelor of mechanical engineering (B.M.E.) were conferred. The degrees civil engineer (C.E.) and mechanical engineer (M.E.) were granted from this time as higher professional degrees.

MILITARY REQUIREMENT

The other legally specified subject, military tactics, was planned most elaborately. The designation "military tactics and engineering" was intended to emphasize the technical aspects of the training. For two bienniums, (1870-1873), the instruction was listed as a co-ordinate course of study, although it was explained that "the classes for military instruction are interspersed through the different courses." From 1874 the military was listed with the special departments. The work extended throughout the four years: freshmen, schools of the

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soldier and company; sophomore, field artillery; junior, bayonet and broad-sword exercises and dismounted cavalry tactics; senior, military engineering, field fortification, topographical drawing, and small sword exercises. As in a number of other land-grant colleges in the pioneer period, the women were organized in voluntary military companies.

DOMESTIC ECONOMY

The education of women for the duties of the household had been an essential feature of the plans of industrial education. The training of farmers' wives was regarded as essential as the training of the farmers themselves, but there was great uncertainty about what such training involved. Gue, in discussing the college program editorially in the fall of 1868, assumed without going into specifications that all reasonable needs would be provided for: "The young ladies will be under the direction of a Matron and Professor of Domestic Economy, who will instruct them in every branch of industry that a thoroughly educated and accomplished woman should understand."

The first matron was not a professor, and the work in the early years was entirely practical. The so-called Mt. Holyoke or Mary Lyon plan of student work was adopted at the beginning. The service was carried on by a rotation of work in the kitchen, dining room, and laundry. In 1872, Mrs. Welch supplemented the practice work by lectures to the senior class. The first instructional course was that of domestic chemistry offered in 1871. The following year domestic economy was taught in a practical way by Mary A. Lovelace, preceptress and housekeeper. In 1875, Mrs. Welch was appointed teacher of composition and lecturer on domestic economy. She continued to direct the latter work until 1883. The first course in cookery was given in 1877, and instruction in sewing and laundry was added in 1879. The first official mention of the work was in the report for 1874-75, where the

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following statement is made: "Domestic Economy is taught to the young ladies of the Junior Class, by lectures on the following topics: Home furnishing, ventilation, water supply, cooking, sewing, management of help, care of the sick, training of children, dress, etc."

Mrs. Emma Ewing, who had gained public recognition as lecturer and writer, was in charge from 1884 to 1888. In 1884-85 a school of domestic economy with a two-year course of study was established. The *Aurora* predicted that henceforth the state would be indebted to the College not only for leaders in agriculture, engineering, and veterinary science, but also for those in domestic economy. However, following brief experience with graduate work (1885-87) Mrs. Ewing accepted a call to Purdue, and the separate course was abandoned, and the work of the department was merged with the general course for women under the direction of an unusually able and resourceful teacher. Mrs. Eliza Owens, the widow of a Charles City lawyer, brought to this instruction a cultural training and keen insight. She was a native of New York and had studied at Ripley College, Pultney, Vermont. Her special interests were music and literature, which she had planned to teach. But when invited to conduct the embryo department, she showed adaptability, and carried on with vision during her transitional eight-year period (1888-96).

THE GENERAL COURSES

The first general science course had its origin in the demand for work adapted to the interests and needs of women students. In the first year they were all classified in the agricultural course, but for the sophomore year a "Ladies Course" was introduced. This was identical with the agricultural in the freshman year, and was followed by a selection of required courses in natural and physical science—a term of domestic economy, history, English language, and political economy, with English literature, French, Latin, music, and drawing

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optional. According to the report of 1876-77, the course was "designed to confer a culture that is at once solid and available." The course was offered to 1880 with the varying titles of "Course in General Science for Ladies" and "Ladies' Course in Science." The degree of bachelor of science was awarded. From 1880 to 1885 the course was merged in that of "Sciences Related to the Industries" for both men and women but with domestic economy included for the latter. For the period 1885-98 graduates of the "Ladies' Course" received the degree of bachelor of letters. This course, designed "to meet a growing demand for the higher education," increased the literature and history requirements with a corresponding reduction of those in the physical and natural sciences. Domestic economy was required for three terms of this course.

The opposite tendency in the general course was in a provision for greater specialization and concentration. From 1876 to 1880 the "Course for Juniors and Seniors in Special Industrial Sciences" was designed to enable upper classmen to "attain a higher degree of proficiency in any branch of industrial science or art" by devoting double time to the selected subject, with specified omissions of other studies. As a limitation upon the range of such specialization, "literary studies and options" were excluded as fields of concentration, and the available subjects were specified as chemistry, botany, zoology, physics, agriculture, horticulture, geology, and veterinary science. President Welch's belief in the importance of training special experts was no doubt largely responsible for this plan, which was in harmony with the emphasis of the main general course of these years.

The blanket curriculum in "Science Related to the Industries," 1880-88, which sought to meet all needs outside of the technical groups, made provision for both general combinations and the specialization provided in the previous arrangement. "Science and Agriculture" in 1889-90 was

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apparently regarded as sufficiently inclusive to cover general science and agriculture as given; but it did not satisfy the desires and expectations of the agricultural interests of Iowa. The interest of certain students in under-graduate specialization was extended, at the earliest possible date, to graduate study.

POST-GRADUATE INSTRUCTION

With the conferring of the first bachelor's degree in 1872, "post graduate" students began to be accepted. In the early years before special programs of graduate study were outlined and advanced degrees awarded, these students merely pursued studies in the undergraduate curricula. The distinction was one of time spent and subjects "taken" rather than of the grade and method of the study. In the catalogue of students for 1873, Calvin P. Wellman of Forest City, a graduate in the agricultural course, was classified as a "resident graduate." In 1874, four were listed as "special students" of whom two were graduates of the College—Luther Foster, '72, Monticello, and Willis O. Robinson, '73, Vinton. For 1873, the special classification included three graduates of the class of '72—Joseph C. Arthur, Charles City; Francis L. Harvey, Springvale; and again Calvin P. Wellman. The following year there was no mention of graduates or specials, but in 1877 the name of Joseph C. Arthur again appeared as a special. By this time definite recognition had been given to graduate instruction, and the requirements and procedure for advanced degrees formulated.

In April, 1876, President Welch in proposing to the faculty that greater provision should be made for departmental specialization added the suggestion that "the question of post graduate courses should receive our attention." The attitude of the faculty on advanced degrees was commendably restrained, and the following November they resolved "that

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for the present we are not prepared to recommend granting of a higher title than *Bachelor of Science*." But with continuing post-graduates in certain departments, the demand for "appropriate" recognition of attainment could not be ignored, and at its annual meeting the following month the Board authorized a special post-graduate course of study.

After considering the matter for a semester the faculty was prepared to act. At a meeting in September, 1877, the committee on course of study was instructed to formulate requirements for a "second degree." The committee submitted a list of ten groups of studies with a professor in charge of each "to instruct and examine the candidates" as follows: Welch, the philosophy of science, social science; Wynn, English literature of the Elizabethan period; Bessey, physiological botany, systematic botany, and special zoology; Stalker, veterinary pathology and materia medica, and principles of breeding; Thomson, applied mechanics; Beal, original designs of engineering structures; Pope, agricultural and organic chemistry; Macomber, advanced physics; Stanton, analytical geometry and calculus; Budd, horticulture and forestry. At this period such a recognition of the technical studies as on a parity with the humanities and the pure sciences was notable. The degrees to be conferred were master of science upon holders of the bachelor's degree either in the Sciences Related to Agriculture or the Ladies' Course, and civil engineer and mechanical engineer upon the holders of the corresponding bachelor's degrees. The requirements indicated sound and relatively high standards: Candidates "shall reside at the College for at least one year and pursue, during that time, a course of scientific study embracing at least two subjects selected with the approval of the faculty, from the programme of post-graduate studies; and shall pass a thorough examination upon that course, showing in one of the subjects special attainments, and shall also present a satisfactory

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thesis." The advanced degrees might also be conferred upon "graduates of this College who have not resided here since graduation, who, at a date not earlier than three years after graduation, shall pass a thorough examination and present a thesis as in case of residence."

In accord with this authorization the first advanced degree was conferred at the following commencement, November, 1877, on a student whose studies and researches had anticipated and perhaps helped to hasten the faculty action. The Board's record of November 12, 1877, is of historic interest. The following resolution was received: "Resolved by the Faculty, That Mr. J. C. Arthur be recommended to the Board of Trustees for graduation in the postgraduate course in Botany and Zoology and that the degree of Master of Science be conferred on him." It was thereupon "ordered that the above resolution of the Faculty be approved and the degree of Master of Science be conferred upon Mr. Arthur." The thesis of the young botanist which was to inaugurate his long and distinguished researches is entitled "On the Structure of *Echinocystis lobata*."

PROBLEM OF HONORARY DEGREES

At the same meeting of the Board, the first honorary degree was awarded, and it was doubtless announced at the commencement although there is no mention of it in the program. On a visit to Ithaca some time previously, President Welch had suggested to his former staff member, I. P. Roberts, that though the lack of a degree had been no handicap to him in the West it might prove to be so in the East, and he offered to suggest to his faculty the granting of a degree on the ground that Roberts' personal study and experience had provided the equivalent of a college course. The faculty subsequently recommended to the Board that in view of the Professor's demonstrated "rare merit and attainments in his chosen pro-

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fession" he be given the degree of master of agriculture and the recommendation was promptly approved. Well merited as this bestowal of a professional degree was, it involved a practice that might be open to great abuse, although the College was to maintain a relatively high standard in such awards. In the early years before advanced technical training was fully developed, the degrees conferred outside of course were more in the nature of the later professional award than of the conventional honorary decoration.

In 1876, a degreeless horticultural professor, retiring without distinction, petitioned the Board frankly for the degree of master of horticulture on the plea that his service for the institution had merited such recognition. After a rejection and a reconsideration the request was finally laid on the table. But most applicants either because of greater merit, stronger influence, or more tactful approach were more successful. The conferring upon Professor Wynn of the degree of doctor of philosophy in 1877 by his alma mater, a small sectarian college in Ohio, brought the delicate comment from the student paper, the *Aurora*, that "Being wholly unsolicited it expresses the just estimation of his ability as a thorough scholar and the respect in which he is held by eastern men." Bessey's honorary award of the master of science degree by his own college in 1872 was followed in 1879 by a doctorate of philosophy from the University of Iowa. In the latter year, perhaps to maintain the balance of faculty distinctions, the College made Budd a master of horticulture and General Geddes a master of philosophy. In 1887 the heads of chemistry, veterinary science, and mathematics were awarded master of science degrees. Prominent alumni, especially those in agricultural teaching, were also remembered with such honors, but by the later eighties the questionable practice was being supplanted by the requirement of degrees in course or in definite professional practice for which the prescribed requirements had been met. The determination of the appropriate advanced

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degrees in the technical courses in which there were no established precedents involved considerable difference of opinion.

ADJUSTING THE FIELDS OF GRADUATE STUDY

The application of two members of the staff who had graduated in engineering courses for candidacy for the master of science degree in 1878 presented what was regarded as a serious question of policy—"Shall the graduates of Civil Engineering and Mechanical Engineering course be considered as eligible to the degree of master of science?" The question was referred to a special committee composed of Bessey, Stalker, and Wynn. The committee reported that "after examining the usages of other institutions in the matter of degrees we have discovered that they are uniformly rigid in adhering to the practice of giving higher degrees only in the line in which the first degrees were taken exactly in accordance with the rules . . . of the Agricultural College . . . and would respectfully submit that neither on authority of the reformed usage of the best institutions nor by any construction of the rules the Faculty has adopted to guide them in conferring degrees can the degree of master of science be given to those who have taken this first degree in departments so technical as those of Civil and Mechanical Engineering." Following "a lengthy discussion" through the afternoon session and an adjourned meeting "extending through the entire evening" (the arguments regrettably unrecorded) the report was rejected by a vote of six to seven. On this issue of "technical" versus "general" the professors of English, botany, civil engineering, veterinary science, and the two chemists were arrayed against the president, the professor of military tactics, the professor of mathematics, the professor of horticulture, the professor of mechanical engineering, the instructor in French, and the lecturer on domestic economy.

A week later a case was presented involving the other

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extreme of subject matter. A graduate student sought permission to study literature and social science for the master of science degree. Perhaps to balance curricular interests, since the engineering case had been submitted to a committee in which literature and general science were in the majority, the literature-social science was submitted to engineers, Geddes, Beal, and Thomson. The majority report was submitted by Geddes and Thomson, Beal dissenting without recorded opinion. The petition was approved on four grounds: (1) "all prominent institutions of learning" conferred the M.S. in courses which embraced a "wide range of Sciences," (2) the committee considered that "any of the Sciences taught in this College may rightly claim the degree of M.S. and among the Sciences taught here they consider Social Science to be one of the most important as well as the most difficult of the Sciences," (3) the faculty had made no distinction among the sciences in the requirements for the degree; and (4) the student had come to college with the understanding that he might take such a course, and a denial of his petition would involve bad faith on the part of the faculty. Again "after long discussion" the vote was taken; this time the decision favored the majority report, nine to five. Wynn and Bessey, keeping to the strict interpretation of the degree, were again in opposition, supported by Beal of civil engineering and Pope and Lee of chemistry.

An attempt was made the following year to provide a more appropriate award for advanced study in literature, philosophy, and the social sciences by the introduction of the eclectic degree of master of philosophy. But there remained the inevitable exceptions and adjustments. When in 1880 a mechanical engineering graduate applied for candidacy for the M.S. degree in mathematics and physics, the rule was amended to include B.M.E. graduates among those upon whom the master of science degree might be conferred.

Meanwhile, with growing specialization and professional

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differentiation, the more technical degrees were being sought. The first professional engineering degree to be given was that of C.E., awarded to Charles F. Mount in 1879. Of students receiving the score of B.S.A. degrees before 1891, one Evert S. Richman, '86, earned the corresponding master's degree (M.S.A.) in 1889.

The most original venture in technical graduate work in these years was in domestic economy. In 1884, upon recommendation of Mrs. Ewing, the Board abolished the undergraduate course and established a two-year course for graduates leading to the degree of master of domestic economy (M.D.E.). Two students were awarded this degree in 1886. Clara Shepperd, a graduate of Drake University, who married Willet M. Hays in 1885, presented a dissertation on "Nitrates, Carbonates, and Phosphates of Food." Nellie E. Rawson, a graduate of the State University of Iowa, was interested in the educational phase of the subject and chose the thesis "Manual Training for Women." Her interest was well motivated, as she had already entered upon the position of teacher of domestic economy in the Toledo, Ohio, Manual Training School at a salary of "nearly \$1,000 a year." In spite of this auspicious beginning and the reported wide demand for such graduates, with the change of professors in 1887 the graduate course was "temporarily suspended" with the promise that it would be re-established as soon as the "Ladies' and Domestic Economy Hall" was completed "or as special demand shall require." Such requirement was not to be made until the modern teaching, research, and commercial demands led to the establishment of the division of Home Economics.

NON-COLLEGIATE COURSES

In addition to the regular curricula there were various special courses that did not lead to degrees. In 1870 normal instruction was provided to give training to students who were regularly devoting the winter vacation to teaching in the

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country schools. To meet the needs of students who desired direct agricultural training in the minimum period, a one-year course in agriculture involving a selection from the technical subjects was provided. The entrance requirements were the same as for the regular course. In addition there were various trials of practical, more or less vocational subjects. Mrs. Ellen Tupper, a bee-keeping expert and enthusiast, gave lectures most entertainingly on this subject during 1873 and no doubt anticipated scientific apiarist work at the College. Bookkeeping, telegraphy, and printing were side-line subjects for which instruction was provided during brief periods.

THE BASIC SCIENCES

The technical work as well as the general courses of study rested mainly on the basic sciences. The mathematics department from 1873 was identified with Professor Stanton, who with an assistant taught all the courses. From 1875 to 1878 his assistant was Miss Margaret P. Macdonald, who became Mrs. Stanton in February, 1877, and retired from teaching a year later.

Following the dropping of Dr. Foote, chemistry was taught by another physician, E. R. Hutchins, M.D., of Cedar Rapids, who had had teaching experience in the East. From 1875 to 1884 the department was in charge of a well-trained modern scientist, Thomas E. Pope, a graduate of Harvard who had been a graduate student and instructor at the Massachusetts Institute of Technology. Pope was largely responsible for inaugurating the modern department. Following his resignation, Dr. Lancelot W. Andrews, a graduate of Yale with graduate training in Germany, was secured for half a year, after which he was called to the State University. Alfred A. Bennett, a graduate of the University of Michigan, was brought from the old Chicago University and saw the department well into the modern period. In physics John K.

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Macomber, of the class of '72, continued until 1883, when he resigned to practice law; and J. C. Hainer, '81, was in charge until 1891, when he also entered the legal profession.

The foundation of the work in the natural sciences was laid by Charles E. Bessey, who came as a youthful instructor in 1870. Bessey's main interest was in botany, but during the seventies he taught courses in zoology and an elementary course in entomology. Professor Beal of civil engineering had charge of zoology in 1880-83. The entomology work was given by one of the most promising young scientists that the College had graduated, Herbert Osborn, '79. In 1883 zoology was again joined to Bessey's department, but with Osborn in charge. Upon Bessey's resignation in 1885 to accept a call to Nebraska, Osborn headed the separate department of zoology and entomology, to which geology was added. Byron Halsted, a Michigan Agricultural College graduate and a Harvard doctor of science, headed the botany work until 1889, when he accepted an appointment in Rutgers University.

Upon the strong recommendation of Osborn and with the support of Bennett and Stanton, the other members of the committee, President Chamberlain was persuaded to secure a young man for the botany work who was to become one of the greatest influences for scholarship and general institutional development in the College's history. Louis Hermann Pammel was a native of LaCrosse, Wisconsin, a graduate of the University of Wisconsin in the agricultural course, and had been a student and assistant of Dr. William Trelease in the Shaw School of Botany at St. Louis. Chamberlain reported that he had had little teaching experience but that he was undertaking the work with great enthusiasm. Teaching experience was soon acquired, and the enthusiasm for his own work and that of all of his devoted colleagues regardless of their fields remained with him through the years. With tireless energy he not only developed the botanical work progressively in the leading lines, but in introducing—under the inspiration

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of Trelease's pioneer lectures on the subject—one of the first courses in bacteriology offered in American colleges, he laid the foundations for a new department.

THE "CULTURAL" STUDIES

With the lack of specialization of the technical curricula and especially in the absence of a rounded professional curriculum for women, heavy demand was made upon the more traditional college subjects. Not only did the ladies' courses consist largely of language and literature, but those subjects were required in the technical courses. Both agricultural and engineering students had English literature and either modern language or Latin specified. Throughout all the courses were sprinkled requirements or options of history, political economy, psychology, and ethics.

In spite of the generous provision for "liberal" studies, either as requirements or options, the problem of substituting general for technical subjects, and the humanities for the sciences, early appeared. In 1876, a request to substitute French for farm engineering was denied. The following year, after considering petitions to substitute English literature and French for required junior chemistry, and a general for a special course in botany which had already been substituted for chemistry, a special committee reported pointedly and pungently: "It is the opinion of the Committee that it is exceedingly dangerous and demoralizing to allow these Special Courses to be made the means of avoiding certain studies and for bridging over defective places in the student's record as seems to have been done in this case. We consider further that no student should be admitted to these Special courses without especial fitness or without some definite object in view; and that when a student has chosen and been admitted to such course it should be without the liberty of its subsequent abandonment on account of difficulties which may arise or on account of not finding the work as pleasant as was antici-

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pated." Hope of faculty accommodation persisted. In 1885 a prominent ministerial student, after having his petition to substitute either Latin or veterinary science for chemistry denied, was allowed to take a special course in that subject if the professor could arrange it, and he was also permitted to "exchange" rhetorical reading for freehand drawing. In contrast the senior class in mechanical engineering in 1887 petitioned to substitute additional engineering work for ethics.

Unfortunately, the provision for the "cultural" subjects was not proportioned to curricular emphasis and student demand. The main department embracing English, Latin, and history was conducted by Wynn to 1887 and then by Barrows. Modern languages were taught at first by part-time instructors, and in the eighties the practice developed of combining the work with the duties of the preceptress. Elocution, the forerunner of public speaking, was much stressed in the early years under the supervision of instructors from other departments who emphasized the delivery of public orations and declamations. From 1876 to 1885 the work was suspended; then, after long agitation in the student publication, it was revived under instructors trained in the leading schools of elocution and expression.

Provision for the social sciences was especially inadequate. Senator Sutton declared in 1884 that history should be the key subject in the curriculum, but no special department was provided in this period. The main work was given by the literature department, but supplementary courses were at times offered by the president. Welch gave courses of lectures in the history of science and in the history of civilization. Economics, not yet arrived at modern assurance, was annexed as a side line to the mathematics department under Professor Stanton.