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A BRIEF HISTORY  
OF THE DEVELOPMENT OF BOTANY  
AND OF  
THE DEPARTMENT OF BOTANY  
AT THE  
UNIVERSITY OF WISCONSIN TO 1900

Geo. S. Bryan

Part I

Wisconsin entered the Union in 1848. A clause in the state constitution, approved by its citizens that same year, provided for the “establishment of a state university at or near the seat of state government.” Promptly in the early summer of 1848 the state legislature passed an act incorporating the University and vesting its government and control in a Board of Regents. In an official sense the University was born on July 26, 1848, when Governor Nelson Dewey signed this legislative act.

The Board of Regents met first in Madison on October 7, 1848, and again on January 16, 1849. At these meetings the following preliminary steps were taken toward the organization of the University: (1) The selection of a site for the University; (2) The establishment of a preparatory school in connection with the university department of science, literature and the arts, manifestly a necessary step, because, as yet, there were few secondary schools in the state capable of qualifying students to enter classes to be established at the University; (3) The election of a Chancellor; and (4) The regents deemed it “expedient and important” that *efforts should be made at once to begin the formation of a cabinet of natural history*. To this end the board accepted the offer of Mr. Horace A. Tenney, a young journalist and public-spirited citizen of Madison, to undertake such a collection, and empowered him to spend a limited sum of money for this purpose. Early in 1849 Tenney was able to report to the board that he had collected: “50 specimen of minerals; 46 fossils; and 12 natural curiosities, chiefly Indian arrow heads and axes.”

At the same time he submitted to the board the following letter from Increase A. Lapham, a young civil engineer of Milwaukee, and an enthusiastic naturalist: “I have sent you by Mr. Z.A. Cotton, representative from this part of our city, a box of specimens for the proposed cabinet of the University of Wisconsin.

“I propose further to present the University a pretty extensive Herbarium or collection of

dried plants—about one thousand or fifteen hundred species—embracing nearly all those heretofore found in Wisconsin, together with others from the United States, and from Europe, provided the Regents will pay the expenses of the paper and portfolios necessary to contain the plants. This will not exceed ten cents for each plant.”

It becomes evident from the foregoing that even in the earliest infancy of the University, the Board of Regents had an active interest in, and concern for, the development of the various branches of natural history. Nor was the newly appointed Chancellor Lathrop unmindful. In his report for the year 1850 he made an impassioned plea for a “Department of the Practical Applications of Science” and particularly as related to agriculture. “It is impossible that the annual yield of land and labor should not be greatly increased in quantity and improved in quality by the universal diffusion among cultivators of a knowledge of the analysis of the soils, of the action of manures, of the elements which enter in the composition of grasses, grains and other agricultural products severally, of the Natural History of plants and animals, and the relation of light, heat, moisture, gravity, etc., to the processes of organic life...Agricultural Science, like all other sciences, can only be acquired by study and research. The discipline of the school is essential to its acquisition. Without it the farming processes fall to the low level of routine and drudgery. With it Agriculture rises to the dignity of a profession.” In his report for the next year (1851) Chancellor Lathrop again urged the endowment of a chair of the “Applications of Science to Agriculture and the Useful Arts.” And among the “Ordinances ordained by the regents” this same year there occurs the following: “6. That there be hereby constituted a Professorship of Chemistry and Natural History; and that it be the duty of the chair to render courses of instruction in Chemistry and its applications, in Mineralogy, Geology, the Natural History of plants and animals, and Human Physiology. ...”

Although the Chancellor and the regents were anxious to fill such a chair, money was lacking to pay the salary. The young institution was having a desperate struggle to make ends meet. Its income was derived wholly from student fees and from the *interest* on moneys received from the sale of lands donated by the Federal Government. From this income the regents had had to find funds for the purchase of sufficient land for the campus and to begin the construction of suitable buildings.

As early as January, 1850, the building committee of the regents had fixed upon the following plan in laying out the buildings and grounds:

“1. A main edifice fronting toward the capitol, three stories high, surmounted by an observatory for astronomical observations;...containing thirteen rooms for public recitation, lecture, library, cabinet, etc., and also two dwelling houses for officers of the Institution.

“2. An avenue two hundred fifty feet wide, extending from the Main edifice to the east line of the grounds and bordered by double rows of trees.

“3. Four dormitory buildings, two on each side of the above mentioned avenue, lower down the hill—each building four stories high—and containing thirty-two studies for the use of students—two students to be assigned to each study.

“4. Two carriage ways fifty feet wide, bordered with trees, flanking each of the extreme

dormitory buildings and both parallel to the wide avenue.”

This ambitious and artistic building plan was of necessity carried out slowly and was never completely realized. The first of the dormitories, North Hall, was finished in 1851 and, opposite it across the “wide avenue,” South Hall was not ready for occupancy until the fall of 1855. The “main edifice,” now the much changed and rebuilt central part of Bascom Hall, was brought to completion in the summer of 1859.

These building activities constituted a heavy drain on the slender resources of the young institution, and left little in the way of funds for the expansion of the staff.

It was not until 1853 that the regents had what seemed to be sufficient funds in hand to pay the salary of someone to occupy the “Chair of Chemistry and Natural History.” They elected Ezra S. Carr, M.D. of Vermont. He promptly declined the invitation and in a letter to Chancellor Lathrop said: “It would have gratified me had the income of the chair...been sufficient to enable me to remove at once to Madison.” In a report to the Board of Regents that year the Chancellor comments: “It is quite obvious that this maximum salary of a Professor in our University, \$1000 per annum, will not secure to this chair the desired usefulness and distinction.”

The board continued its search and early in 1854 announced that S.P. Lathrop, M.D. of Beloit had accepted the position. Prof. Lathrop came to the University for the spring term “in order that scientific instruction might be supplied to the first graduating class.” (8) It is also related that he gave the first lectures in chemistry with the aid of apparatus borrowed from Beloit College.

The *Report of the Board of Regents* for 1854 states that the Senior Class had had in the spring term of that year a course in “Botany and Philosophy.” This is the first reference to a course in Botany offered at the University and, apparently, it was given by Lathrop. But the new Professor of Chemistry and Natural History was not a well man. His health rapidly failed and he died in December having held his position for less than a year.

The vacancy was not filled at once. After a delay of nearly a year the board announced that Professor Carr had again been offered the chair and this time had accepted. In the *Report of the Board of Regents* we find this quaint notation, “Ezra S. Carr, M.D. Inaugurated January 16, 1856. The Faculty is now full.” (6 professors–148 students.)

Ezra S. Carr was born in Steppentown, N.Y., March, 1819. He was graduated from the Rensselaer Polytechnic School in Troy and was immediately appointed an assistant in the geological survey of New York. When not actively engaged in the field he continued scientific and medical studies at the University of Albany. He removed to Vermont and in 1842 received the degree of doctor of medicine from Castleton Medical College, Vermont, and was immediately appointed Professor of Chemistry and Natural History in the institution. From 1846 to 1850 he divided his time, giving lectures at both Castleton and the medical school at

Philadelphia. In 1853 he became Professor of Chemistry and Pharmacy at the University of Albany, and, as we have seen, came to Madison in January 1856 to occupy the chair of Chemistry and Natural History.

When Dr. Carr arrived there were but two buildings on the campus, the North and the South dormitories, the latter having just been completed and occupied. Both buildings also provided a certain amount of classroom space. In the *Report of the Board of Regents* for 1856 we learn that in the south half of South Hall there are four “public rooms”: a lecture room on the first and on the third floor; the cabinet of Natural History on the second; and the embryo library on the fourth floor. “One of the lecture rooms has been seated and furnished for the use of the Professor of Chemistry and Natural History.”

In the same report Professor Carr, describing the work he expects to do, states: “Instruction will be rendered in this department mainly by a regular series of lectures with intermediate examinations. The lectures will be attended by ample experiments and demonstrations illustrative of the general reasonings in each science. The course...will occupy one year...fall term, Geology and Mineralogy; winter term, Chemistry; spring and summer term, Botany and Zoology, etc.” This instruction was given only to members of the senior class. Professor Carr seems to have been interested primarily in chemistry and geology and as a result botany and zoology were given rather scant attention. In 1858 Professor Carr thus describes the content of the botany course offered in the spring semester: “Botany—the Plant being first considered as an individual in reference to the nature and processes of vegetable life; second, its relation to other plants, or the Vegetable Kingdom; third, its uses.” As textbooks the following are listed: “Wood’s, Grey’s Works<sup>1</sup>, Lindley’s *Vegetable Kingdom*.” It may seem surprising that, at a time when instruction in botany in the United States was chiefly a matter of naming and describing plants and in making local herbaria, Carr appears to have given so little attention to this phase of the subject. The answer is probably to be found in the nature of the course that the Board of Regents expected Professor Carr would give. Just prior to his arrival at Wisconsin the board stated “he will lecture on Agricultural chemistry and the *applications of science* to the *useful arts*. This course of instruction is expressly designed for young farmers and artisans of the State.” The emphasis, it will be noted, is upon the *practical aspects* of the sciences taught. Without doubt Professor Carr’s “course” was intended to become the nucleus about which an agricultural department could be built.

An interesting sidelight is thrown upon Professor Carr’s methods of teaching by the following excerpt taken from the *Report of the Regents* for 1857: “The instruction in this department is given by lectures and demonstrations on the part of the Professor...The recitation of the student consists in *his* giving a lecture, illustrated with experiments and demonstrations on the same subject and after the manner of the Professor.”

One of the interesting aspects of these early days in the history of the University is to be

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<sup>1</sup>This error in spelling Asa Gray’s name occurs in several subsequent reports.

found in the eager and at times reckless financial support of the Cabinet of Natural History. Starting with the modest collection begun by H.A. Tenney in 1849, to which reference has already been made, the cabinet grew rapidly both in numbers and in types of specimens. In 1851 we learn from the *Report of the Board of Regents* that “The Herbarium furnished to the University by Dr.Lapham is in a state of careful preservation and will be of very great value to the future student as illustrative of the natural production of Wisconsin.” In 1856 the Board of Regents made the rather astonishing appropriation of \$1200 to purchase a collection of fossils owned by Dr. Carr, and in 1857 reported as follows: “The Cabinet has been greatly enlarged by the purchase of the valuable collection of Professor Carr made at Albany, etc. Containing full suits of New York fossils, it will afford means for the solution of questions which may arise in the prosecution of the geological survey of our State without the necessity of going abroad for the purposes of comparison and classification.”

In the same year ex-Governor Farwell presented to University “a collection in Natural History comprising the fauna of Wisconsin and the Northwest, and enriched by specimens from other portions of this Continent and from the Old World.”

In 1865 the following inventory of the Cabinet was made by Professor Carr who was responsible for its care:

6450		specimens of minerals, fossils, etc.
50	“	” corals
2000	“	” marine shells
11	“	” fish
54	“	” reptiles
65	“	” quadrupeds
332	“	” birds
50	“	” miscellaneous
3000	“	” Herbarium
50	“	” Curiosities
75	“	” Seeds and Woods

Professor Carr was proud of the Cabinet and declared it to be, with the exception of that at the University of Michigan, the “finest collection in the Northwest.” It was valued by him at not less than \$15,000.”

At the same time Professor Carr lists among the meager items of class equipment and apparatus for which he is responsible—one microscope valued at \$100! It must be remembered, however, that Cabinets were among the institutional fads of the day. No first-class college, or university was supposed to be without one. That they were expected to play an important role in state universities is clearly set forth, for example, in the following letter to Chancellor Lathrop from I.A. Lapham of Milwaukee dated November 29, 1851:

“I send you a systematic catalogue of animals, so far as they have been observed, or their existence clearly ascertained, in this State. It is presumed...that it will have its use in forming the

Cabinet of the University, which, it is understood, is intended to embrace and exhibit, at one view, the natural resources of the State. Such a Cabinet would be of inestimable value not only to the officers and students of the institution but to citizens generally and to strangers, who, in great numbers visit our State to view and examine for themselves her natural productions. It should have for its object the illustration of the principles of science rather than unmeaning display of showy articles.”

One may well question whether the Cabinet ever met the high ideals set forth in this letter from Lapham. That all persons were not equally enthusiastic over the Cabinet is apparent from other references which rather decry the “moth eaten” animals and the “dusty specimens.”

The Civil War brought added difficulties to an institution which had already been hampered by political conditions in the state, by powerful adverse criticisms concerning the types of instruction offered, and the manner in which university affairs had been handled. By the close of 1862 most of the students had gone to the war, and, although salaries had been slashed, the institution virtually faced bankruptcy.

In this emergency the authorities put into effect a long-considered plan of establishing a Normal Department open to women as well as to men. Co-education, beginning as a war-time emergency, was destined to remain as a fixed policy of the University.

A three-year course was established for the Normal Department, and in the “middle year” zoology was offered in the second term and botany in the third. The students in both courses were taught by Professor Carr.

With the close of the war and the return of men to classes, Wisconsin entered upon a new period ushered in by the reorganization of 1866. In 1862 President Lincoln had signed the Morrill Act, under which the state of Wisconsin would be granted 240,000 acres of public land, “thirty thousand acres for each senator and representative in Congress.”

The purpose of the gift was to provide endowment for “at least one college where the leading objective should be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and mechanical arts...in order to promote the liberal and practical education of industrial classes in the pursuits and professions of life.”

In order to qualify for the benefits of the Morrill Act the State Legislature, in 1866, passed an act reorganizing the University. Some of the provisions of this state law were: (1) that there should be a college of arts; a college of letters; and such professional and other colleges as might from time to time be added; (2) that there should be a President with certain limited powers instead of a Chancellor; (3) that the regents should “make arrangements for securing without expense to the state, or to the funds of the University, suitable lands in the immediate vicinity of the University, not less than two hundred acres, including the University grounds, for an *experimental* farm”; and (4) that Dane County is authorized to issue forty thousand dollars

worth of bonds, the proceeds of their sale to be applied to the purchase and improvement of the aforesaid experimental farm.

In a report to Governor Fairchild in 1866 Edward Solomon, President of the Board of Regents, emphasizes the requirement of the reorganization act, namely, “that an *experimental* farm is to be provided.” It is to be “an *experimental* rather than a *model* farm.” Agriculture is to be studied through *experimentation*. In this manner was laid deep and strong the foundation plan of the College of Agriculture.

In the shakeup that followed this reorganization, Professor Carr resigned in the year 1867; and the regents, on recommendation of the newly chosen President Chadbourne, elected John E. Davies to be Professor of Chemistry and Natural History, and William W. Daniells Professor of Analytical Chemistry and Agriculture.

John E. Davies was born at Llanidloes, Wales, in 1839, and at an early age came with his parents to this country. In 1855 the family removed to Wisconsin, and in 1862 young Davies was graduated from Lawrence College with the A.B. degree. He immediately enlisted in the army and served until the close of the war. Returning to Wisconsin he taught for two years at Lawrence as Professor of Physics and Chemistry, and one year at the Chicago Medical School (now the medical department of Northwestern University) as lecturer in chemistry. In 1868 he received the degree M.D. from the Medical School, and in the summer of that same year returned to Wisconsin to enter upon his duties at the University.

William W. Daniells was born in Michigan in 1840. In 1860 he entered the Michigan Agricultural College and, having graduated with the degree of B.S. in 1864, was immediately appointed as instructor in chemistry in the same institution. Later he spent two years at the Lawrence Scientific School at Harvard, and early in 1868 came to Madison.

The University now had *three* men who were capable of giving instruction in the botany of that day, since the new President Chadbourne had himself held the Chair of Botany and Chemistry at Williams College and later at Bowdoin.

As a matter of fact, Davies was primarily interested in physics and mathematics; while Daniells leaned strongly in the direction of chemistry. It is to the great credit of the latter that on his arrival he at once established a chemical laboratory, in the basement of the south wing of Main Hall, “the first laboratory possessed by the University.” (4) Daniells however was not very popular with his colleagues who also had classes in Main Hall. There were some bitter comments on the “horrible smells” and “stinks” that emanated from the basement and pervaded the building!

The establishment of laboratory work in biology did not begin, as we shall see, for another decade. As for President Chadbourne, “he was known to have confessed that he thought he could teach any subject in the curriculum better than it was generally taught.” (8) The reorganization of the University brought about a new curriculum in which botany, at first offered

in the sophomore year of the College of Arts and in the College of Letters, was later (1873) transferred to the freshman year. That this course was actually given by President Chadbourne in 1869 is indicated by the following excerpt from the regents' Reports for that year: "The following are the regular courses of lectures:...To the Sophomore Class on Structural and Systematic Botany, by the President; on Practical Botany and Agriculture, by Prof. Daniells."

On Chadbourne's departure in 1870, Davies is listed as taking over the lectures on structural and systematic botany, which embraced a discussion of "the microscopical examination of tissues and minute structures; germination and growth of plants; general principles of plant classification; limitations of species and varieties; and exercises in botanical analysis." Daniells' lectures in practical botany and agriculture covered the following topics: "Botanical characteristics and geographical distribution of natural orders and their relative importance; the genera and species having agricultural, commercial, medical, or ornamental value; noxious plants...weeds or poisonous plants."

Not only did Professor Daniells offer the above course but several electives such as: Horticulture, History of Useful Plants, Forestry, etc., which appear in the list of studies. It seems that these electives were not actually given because of a lack of students and they eventually disappeared from the catalogue.

The course in Agriculture somehow did not strike a responsive chord among the students of the eighteen seventies. Even as late as 1880 the Board of Visitors reported that they could find no students in the agricultural department, nor anyone who had graduated from the course. That this was a slight error has been pointed out by Pyre. (8) It appears that *one* student did graduate as Bachelor of Agriculture in 1878!

The causes for the failure of the course are undoubtedly to be attributed to the general conditions of the time. Daniells himself is said to have been a "loveable, conscientious and diligent" man. His were pioneer labors which helped to pave the way for the success of later workers.

## PART II

With the arrival of President Bascom in 1874 the institution began to move slowly into a new period of its existence—the gradual evolution toward a university through specialization in subject matter. In this process John Bascom played a distinguished role. He was himself a superlative teacher; a man of vision who realized that "all important teaching should be in the hands of men of specific learning"; furthermore, he appreciated the necessity of affording staff members time for private study and research in order to vitalize their teaching and activity.

In his last report to the Board of Regents (1885) occurs this significant paragraph: "The smallness of salaries begins to be felt, and the most ready remedy is to reduce the instructional force, increase the recitation work of each professor and enlarge his pay. This policy will, in the end, be found very ruinous to higher attainments as a University. Men of original powers and desirous of fresh research in their own departments will not seek an institution of this character

and will leave it when a more free field is offered them. Those who are content simply to give instruction in familiar things and take their pay for it will form the governing power of the University and this means the decay of all large incentives in teacher and student alike.”

A first step toward specialization in teaching occurred in 1874 when Davies moved from the Chair of Chemistry and Natural History to that of Physics and Astronomy and President Bascom brought to the University in the next year a young man, (destined to play an outstanding role in the history of the institution), Edward A. Birge, to be Instructor in Natural History and Assistant Curator of the Cabinet.

Birge was born at Troy, New York, in 1851. He studied at Williams College, receiving his A.B. degree in 1873. Bascom was one of his teachers and observed at once the keen and penetrating mind of this student. On leaving Williams, Birge began graduate work at Harvard under Agassiz, who unfortunately died a few months later. After completing two years of graduate study he accepted Bascom’s offer and came to Wisconsin in 1875.

The new instructor in natural history apparently continued to offer, for a year or two, the same type of botany as that given by his predecessor. But the catalogue for the year 1877-78 contains, for the first time, a brief description of the courses taught in each department. From this account we learn that Mr. Birge was giving all the work in natural history; and that there were two courses being offered in Botany.

“The *preparatory* course is given in the third term (spring) of the year. The subject is studied by the Scientific, and Modern Classical sub-freshmen; and by the Ancient Classical Freshmen. The text-book used is Gray’s *Manual with Lessons*. After the appearance of flowers two *recitations* in the week are devoted to careful analysis and description of plants: one plant occupying an hour. The students are required to mount and name an herbarium of 35 specimens.

“The *advanced* course in Botany consists of Lectures given to the Modern Classical, and Scientific Freshmen. The subjects of Vegetable Anatomy and Physiology are treated of in the Lectures, and two days in the week are given to analyses. The students are required to hand in an herbarium of 50 specimens and write descriptions of 12 plants.”

Assuming that this excerpt from the catalogue is trustworthy, it becomes evident that instruction in botany at this time was chiefly by means of recitations supplemented by lectures; but the germ of laboratory work appears in the careful analysis of plants in flower.

In the scholastic year 1878-79 an additional and optional course in analyses of plants was offered in the first term (fall) to sophomores. “It begins with the opening of the term and lasts usually about six weeks. Practice in identification of flowers is thus secured and an acquaintance with fall flowers gained.”

Meanwhile there had been progress in the physical plant and equipment of the University. In 1877 a desperately needed Science Hall (now remembered as Old Science Hall) had been

completed and occupied. The main portion of the building was a massive, four-storied, rectangular structure, 136 feet long and 60 feet in depth. Two wings, each 78 feet long and 42 feet wide, extended from the rear. This building is said to have housed “the laboratories, the lecture rooms and the ‘studies’ of *all* of the professors of science,” a statement not entirely accurate. Proof will be given presently that classes in botany and in agriculture were held elsewhere. Much of the University Cabinet which had been located in South Hall was transferred to and occupied a large portion of the fourth floor of the new building. We learn that the Cabinet had been “greatly enriched” by a legislative act in 1876 authorizing the governor to purchase for \$10,000 and turn over to the University the library and Cabinet of I.A. Lapham, recently deceased. In this newly purchased Lapham Cabinet there was said to be an *herbarium* of 20,000 specimens. Fortunately the herbarium of the Cabinet was never stored in the new Science Hall. For seven years that building was the show place and pride of the University. On the night of December 1, 1884, the structure was wrecked by fire and its contents destroyed.

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In 1879 President Bascom was able to make further progress toward his ideal of specialization of respecting subjects taught. Reporting to the Board of Regents that year he writes, “If a professor is to do really superior work his entire labor must be confined to a single department, or to closely allied departments.” Apparently the regents were agreeable, for Daniells gave up his attempts at agriculture and was assigned to chemistry alone; Edward A. Birge, who had just received the degree of Ph.D. at Harvard, was appointed Professor of Zoology; and J.C. Arthur was named Instructor in Botany.

Arthur was born at Lowville, New York, in 1850. In 1870 he was a student in Prof. C.E. Bessey’s first botany class at Ames, Iowa. Emphasis in the course was on analysis and description of cultivated and native plants. Each member of the class was required to collect, press, mount and accurately name 100 different species of plants. Arthur developed into a keen taxonomist. It is narrated that at examination time he was able to give the Latin names of the 50 required specimens “by the shadow seen through the mounting paper when the sheets of dried plants were held at the window with the backs turned toward the students.”

In 1872 Arthur graduated from Ames with the B.S. degree. In the scholastic year 1878-79 he was appointed honorary fellow at Johns Hopkins, working there under Farlow who was on leave of absence from Harvard; and during the summer of that year he studied at Harvard under Dr. Goodale.

Arthur came to Wisconsin at the close of the summer of 1879 well versed in many of the newer aspects of the botany of his day. However he remained only a year. What changes he made, if any, in the courses are not clear.

“In June, 1880, W.A. Henry was appointed Professor of Botany and Agriculture. He was required to give all the botanical instruction offered in the University.” The above quotation is taken from the 20<sup>th</sup> *Annual Report of the Agricultural Experiment Station* and was written by

Henry himself. He was born in Ohio in 1850; studied at Ohio Wesleyan, 1868-69; taught school for several years, and finally entered Cornell University from which he was graduated in 1880 with the degree of Bachelor of Agriculture.

On coming to Wisconsin, Henry was faced with a heavy task. He was not only responsible for the work of the Experimental Farm but, as previously noted, was required to give all of the botanical instruction then offered in the University. It must have been, therefore, with great pleasure that in the early spring of 1881 he greeted William Trelease who had been appointed Instructor in Botany.

Trelease was born in Mount Vernon, New York, in 1857. As a young man he showed a strong bent for natural history and was graduated from Cornell University with the degree of B.S. in 1880, specializing in entomology as well as botany. In these early years, he was particularly interested in the subjects of the secretion of nectar, and in the cross-pollination of flowers by insects.

In 1883 Trelease was promoted to Professor of Botany and Henry's title was changed to Professor of Agriculture. It was in this year, also, that the Agricultural Experiment Station was organized. Henry had succeeded in getting a small appropriation from the State Legislature for the study of sorghum in the making of sugar, and for the construction of silos in the formation of ensilage. This work had been so successful that Governor Rusk recommended in his message to the legislature that an Experiment Station be founded, which was done in 1883, with the following personnel:

W.A. Henry, Professor of Agriculture  
Wm. Trelease, Professor of Botany  
H.P. Armsby, Professor of Agricultural Chemistry

Professor Henry was clear in his own mind as to the basic work of the Experiment Station. "Its purpose," he states, "is to investigate questions of special interest to the farmers of the state. It is to be expected also that the results will not only have general value but may be real contributions to agricultural science." The people of the state were requested to send to the Experiment Station: specimens of weeds and introduced plants of questionable value; cultivated and other plants attacked by fungi (rusts, smuts, mildews), and noxious insects. Professor Henry further states that, "The names of unknown plants will be furnished if specimens are sent in, and seeds will be examined as to purity and vitality. All work of general interest will be free of charge in so far as facilities of the Station permit."

Henry's ideal of service to the agricultural interests of the state proved to be not only of inestimable value to the farmers of Wisconsin but also to the University itself as it eventually moved into an era of rapid expansion.

The year 1883 also saw the beginning of courses in pharmacy under the newly appointed Frederick B. Power, Professor of Pharmacy and Materia Medica.

Meanwhile, under Trelease and Henry, the inherited courses in botany had been modified and expanded and new courses established. One notable feature was the introduction of *laboratory work* in one or more of the *advanced courses*.

Two short, i.e. single term, courses were offered in the spring: an elementary course for freshmen consisting of *recitations* from Gray's *Lessons* supplemented by *lectures*; the second, a more advanced course for sophomores, embraced *recitations* from Bessey's *Botany* accompanied by *lectures* on physiology and systematic botany, the latter dealing particularly with plants of economic importance. Microscopic *demonstrations* were given as an important feature of this course. Students in both courses were required to form an herbarium of 35 specimens correctly named and properly mounted.

A different course was required of all sophomores in agriculture and covered two terms. In the fall the students began the study of the structure and development of the Cryptogams, especially the fungi injurious to higher plants. The course consisted largely of *laboratory work* using compound microscopes and supplemented by lectures and field excursions. In the winter term the students continued with a study of Phanerogams, particularly grasses, weeds and forage or other useful plants.

In addition to these courses Trelease offered horticulture to juniors, and forestry to seniors, in agriculture. The Course in Horticulture covered two terms. The work of the first term combined "Economic Entomology" and "Cross-Fertilization of Plants" and involved laboratory, lectures and field experiments. The study was continued in the second term "by *recitations* from Lindley's *Horticulture* and Darwin's *Animals and Plants under Domestication* accompanied by lectures on the physiology of plants and laboratory work in their cell structure."

As to forestry we learn from the catalogue that "The class recites from Hough's *Forestry* and lectures are given on fungi and insects which attack forest trees."

The modification and expansion of courses in botany during these years was not peculiar to Wisconsin. In fact, the decade from 1875 to 1885 roughly marks out a turning point in the development of botany in American institutions.

It should be remembered that in 1865 there were only two men in the United States who earned their living as professors of botany—Asa Gray at Harvard and D.C. Eaton at Yale. It is true that Torrey taught botany at Columbia, but he had to spend much of his time in assay work in order to eke out a meager salary.

The study of botany, at least in most college classes of this period, was carried on chiefly as an adjunct to the course in medicine. It will be recalled, for example, that S.P. Lathrop, Carr, and Davies, Professors of Natural History at Wisconsin, all held the degree of M.D. But the times are changing. Already in 1872 Farlow, who was then at work with de Bary at Strassburg, wrote, apparently with some surprise, that he was the only botanical student there at the time

who had studied medicine.

By 1885 botany was becoming well established in the United States as a profession in its own right.

Another change within the decade is to be noted in the content of the course of study. Taxonomy had dominated American botany to the practical exclusion of other phases of the subject. On the other hand such was not the case in Europe and particularly in Germany, where, during the 'sixties and 'seventies, the researches and publications of Hofmeister, Sachs, deBary and others had opened great new fields of botanical study.

This new work had, however, received little attention from American botanists because few of them could read German, and further, with the slim budgets available, books and periodicals from that country were not readily available.

A distinct turning point came in 1880 when C.E. Bessey published his epoch-making *Botany for High Schools and Colleges*. The importance of this book is admirably set forth in the following review written by John M. Coulter for the *Botanical Gazette*, September 1880.

“The question may naturally arise in the minds of many teachers, what need is there of another botany? We have Gray’s, Wood’s, Youman’s, etc., almost every publishing house being represented by a botany; surely it is but publishers’ rivalry that is throwing this new book upon the market. Even a casual glance will show, however, that we have no stereotyped repetition of books gone before, but a *new departure* in American botanical text books . . . Once the study of a little morphology, the learning of a few terms in the glossary, and the analysis of a few flowers was thought to be all the profitable study that botany could furnish students. But this state of thought has entirely changed and plants are getting to be recognized as living organisms that have life histories, that have digestion, nutrition, assimilation, respiration, reproduction, and other functions just as remarkably performed as in animals...It is evident that we can study plant physiology as well as anatomy, and it is this very thing that has so long been neglected in our schools...Our great botanists have been systematists, has in perfectly natural in a country just developing its flora, hence all botanical work in the schools has followed the same bent. Such work is not to be decried,—but it is not all of botany.”

“Of necessity the book could not be entirely or even mostly original, but rather in Part I a following of that done in German laboratories, and, based chiefly upon Sach’s great *Lehrbuch*. In Part II the higher plants, of course, conform to the system of Bentham and Hooker. The classification and treatment of the lower plants seems to be the author’s own work and is probably the part of the book that is most original.”

A third change within the decade is to be noted in the slowly increasing employment of the laboratory system in connection with the teaching of botany.

Prior to 1870 laboratory work in botany was almost unknown. At Harvard, for example,

Dr. Wm. P. Beal who studied there between 1862 and 1865 writes: "During one spring Dr. Gray met three of us for lessons in this text book (Gray's *Botanical Text Book*) freely illustrated by fresh specimens. The botanical department at Harvard did not own a compound microscope but had the use of a thousand-dollar instrument belonging to the Lowell Institute. A little crude work was done, such as viewing the streaming motion of granules of chlorophyll in leaf section of *Valisneria*, looking at grains of pollen, sections of ovules, etc."

By 1884, according to J.C. Arthur, more than a dozen prominent institutions of learning in this country had established laboratory work in some, if not all, of their courses in botany; and two institutions, Cornell University and Michigan Agricultural College, had progressed to the point that each had erected a building exclusively for botany.

The manner in which textbooks were used in the earlier days apparently varied but little from institution to institution. Too often so many pages of the given text would be assigned for each lesson, and the nearer the recitation of the student corresponded word for word with the text the more highly was his knowledge and grasp of the subject supposed to be.

The slowness in developing laboratory work in botany at Wisconsin is undoubtedly to be attributed in part to a lack of suitable rooms for the course. Dr. L.H. Pammel who began his botanical studies at Wisconsin in 1881 wrote, "I had my first botanical instruction in the old main building on the hill. The lectures were given in what was then the chapel and now (1927) is the office of the President or, at least, was his office at the last time I visited the University. It may be of interest to state that we used Bessey's textbook then just issued by Holt. The following fall the quarters of the department were in Old South Hall. Prof. Trelease had his office on the second floor at the south end, and the lecture room was on the first floor and the laboratory on the second floor. here we received our first instruction in cryptogamic botany, as it was called, which was followed by courses on flower ecology, systematic botany, etc....Prof. Henry was the agricultural department, and under him we had a variety of courses in agriculture, live stock, and farm crops."

Further valuable information concerning classrooms and equipment in botany is recorded in the report of Professor Trelease, to the Hon. George H. Paul, President, Board of Regents, dated October 1, 1884.

"When I was called to the University to give instruction in Botany in the spring of 1881 I found it the minor part of a composite department—agriculture and botany—with few facilities for instruction and no rooms except those of other departments which could be used only when not required for other purposes.

"At present (1884) the department occupies the greater part of the first and second floors of the renovated south building (South Hall) containing a lecture room, a reagent room, laboratory, museum and herbarium, while there is the possibility of further addition when this shall become necessary.

"The lecture room is capable of seating 100 students and is on the ground floor. The

reagent room is furnished with good chemical desks and a set of chemicals needed in the preparation of such reagents as are used in vegetable histology and microchemistry. In it all operations attended by the evolution of gases likely to injure the microscopes and other laboratory apparatus can be performed.

“The laboratory is sufficiently large to accommodate 20 tables and is equipped with six dissecting microscopes and ten *good* compound microscopes giving a range of magnifying power from 20-2000 diameters, besides other instruments useful in the microscopic study of plants.

“The museum is a room of equal size adjoining the laboratory. Some of the more interesting fungi of the state, and a collection representing the wood of several hundred species of trees are now being arranged in it. Collections of Wisconsin weeds and grasses and a set of models of the varieties of fruits recommended for growth in the state will shortly be added. These are intended for agricultural students and farmers who visit the University.

“The University herbarium, which is located in the room devoted to my original work, is based on the Lapham herbarium estimated to contain between 10 and 12 thousand *species*, which has been thoroughly poisoned and is being properly mounted as rapidly as possible. Since it came into my charge it has been augmented by donations of several hundred species from the Department of Agriculture at Washington, by a set of exotic forms from Cornell University, and by between 3 to 5 thousand specimens from Professor Henry’s herbarium and my own. The specimens donated by Professor Henry included a valuable set of alpine plants from the Rocky Mountains and many California species.

“The lectures are illustrated by a set of 60 Veny’s Botanische Wandtafeln representing the minute anatomy and development of plants; and both actual specimens and fresh and mounted preparations under the microscope are employed in demonstrations whenever it is practical to use them.

“A practical familiarity with the common plants of the state is secured by requiring each student to form a small herbarium. In the systematic laboratory courses constant reference is made to the University herbarium which is supplemented by the private collection of the professor containing several thousand species of parasitic fungi, including all that are known to occur in the state of Wisconsin. The collection is constantly being added to from all parts of the world.”

In regard to the fungi mentioned in the above paragraph it should be stated that Professor Trelease, during his stay at Wisconsin, devoted much time to a study of bacteria and fungi, and made the first comprehensive survey of the parasitic fungi of the state. In 1884 Trelease received the Ph.D. degree from Harvard, his thesis being on the subject, “Zoogloae and Related Forms.” This paper was published in the studies from the Biological Laboratory of Johns Hopkins University, Vol. 3, 1885, and is notable as being probably the first doctor’s thesis written in this country in the field of bacteriology. Under the stimulus of this work the

University authorized Professor Trelease to order, in the spring of 1885, special bacteriological equipment from Europe. Shortly afterwards, however, Professor Trelease was offered and accepted an appointment as Englemann Professor of Botany at Washington University, St. Louis. He left Wisconsin at the close of the summer at 1885.

An interesting development centered about this bacteriological equipment. Since Professor Trelease had departed, it fell to Dr. Birge to unpack the apparatus on its arrival. In an address on the beginnings of the pre-medical course in the University delivered in 1935, Dr. Birge stated: "It was quite unthinkable that an equipment so large and valuable should stand idle, so I was told to get busy and teach bacteriology, which accordingly I proceeded to do. My course was regularly given but it was not announced in the catalog for the first two years, for I regarded my part in it as a temporary affair and expected to turn it over to the botanist who would succeed Dr. Trelease. But the first appointments were temporary matters, and then Professor Charles R. Barnes came as botanist in 1887 it turned out that he knew little and cared less about bacteria, so I, who meanwhile learned a little about them, was obliged to continue the course."

Later on we shall note further progress in bacteriology at Wisconsin.

By the summer of 1883 the renovation of South Hall had afforded space not only for classes in botany, but the courses in pharmacy had taken over a part of the fourth floor, while Professor Henry had finally been able to secure a laboratory and office on the third floor. *For more than a decade after this time South Hall was designated as Agricultural Hall!* Students were slowly being attracted to Henry's classes. But experimental work on the farm was not progressing well. The reasons are clearly set forth in one of Professor Henry's early reports.

"Many persons seem to regard the farm as a mere pleasure ground. Plots of grain have been trampled down, labels misplaced or destroyed. Fruit is taken from the orchard when scarcely half grown, and this season *all* the grapes were stolen before some of them had time to color...Experiments that have cost much time and labor have been brought to naught until thoroughly discouraged we are really doing nothing on the experimental farm to advance horticulture...It would require two watchmen, day and night, a part of the season to secure immunity from these depredations. *As our work seems to be shut off in these directions we shall turn toward dairying and stock feeding experiments for which we will soon be prepared and which cannot be harmed by marauders.*" In this manner was Professor Henry literally driven into a special line of research which later brought him national fame.

With the departure of Trelease in 1885, and upon his recommendation, Arthur B. Seymour came to Wisconsin as Instructor in Botany, but remained only for the academic year 1885-1886.

Seymour was born at Moline, Illinois in 1859; graduated with the B.S. degree from University of Illinois in 1881; served as botanist, Illinois State Laboratory of Natural History 1881-1883; and spent the two years before coming to Wisconsin at the cryptogamic herbarium,

Harvard.

He was succeeded during the academic year 1886-87 by Frederick L. Sargent.

Sargent was born at Boston, Massachusetts, in 1863; studied at the College of the City of New York from 1879-82; and at the Lawrence Scientific School, Harvard, 1883-86. He also remained at Wisconsin only a year.

In the winter of 1886 an important development occurred in the opening of the Short Course in Agriculture, which was ordered established by the Board of Regents over the doubts and fears of Professor Henry. The distinctive features of this development were as follows: any person of suitable age with common-school education could enroll; the term should embrace 12 weeks beginning in January when farmers' sons have most leisure; the subject matter should be practical and have a direct bearing upon every day matters on the farm.

Twenty young men enrolled the first year and attended daily lectures in chemistry, botany, and applied agricultural practices, with occasional lectures by the state veterinary officer on the diseases of animals.

The Short Course in Agriculture has undergone, in the 60 years of its existence, a variety of modifications, but it remains today as one of the important contributions of the Agricultural College to farming interests of the state.

In the summer of 1887 Charles R. Barnes was called to Wisconsin as Professor of Botany.

Barnes was born in Indiana in 1858. He attended Hanover College and graduated with the A.B. degree in 1877. While at Hanover he studied botany under John M. Coulter, and from that time dated their life-long friendship and scientific collaboration—first in taxonomic studies, then as joint editors of the *Botanical Gazette*, and, finally, as colleagues at the University of Chicago.

After graduation, Barnes taught high school and during the summers of 1879 and 1880 studied at Harvard under Asa Gray. He was teacher of Biology at Ford High School at Lafayette, Indiana, when Professor Hussey, biologist at Purdue, suffered a sudden stroke. Barnes was called upon to take over the work and in 1882, his ability having been proved, was appointed Professor of Botany. In 1885 he was granted a year's leave of absence to study plant physiology at Harvard under Goodale.

Barnes came to Wisconsin just as the new Science Hall was being occupied. The catalogue of 1887-88 gives a full description of the building and emphasizes the fact of its fire-proof construction—no wood being used except for floors, doors and window frames. The staircases are of iron with slate treads. This building housed at first: the various branches of engineering; physics; geology; mineralogy; botany, and zoology. Botany and zoology shared

together an elementary laboratory on the third floor—a large room arranged to accommodate 72 students. The laboratory was fitted with both dissecting and compound microscopes. A smaller adjoining laboratory was used for advanced work. Important pieces of botanical apparatus were listed as: a sliding microtome, and a direct vision auxanometer. For illustrating the lectures there were specimens especially provided in a case in the lecture room. Considerable space on the third floor was occupied by the herbarium which is described as being chiefly composed of the Lapham Herbarium purchased by the state and said to contain about 8,000 *species* of flowering plants.

On coming to Wisconsin Professor Barnes began to broaden the types of courses offered by the department of botany. In the catalogue of 1888-89 he is listed as offering the following:

*Morphology of Flowering Plants*—an elementary course involving lectures, laboratory and field work. Naming a considerable number of common plants is regarded as an important feature of the course.

*General Morphology*—a year course for advanced students. The features stressed are: a study of the cell; and the life histories of important types in the plant kingdom.

*Histology*—a study of the tissues of phanerogams and ferns. Imbedding, section cutting, staining, mounting, etc.

*Embryology and Physiology*—a year course involving a study of embryo development, but much time given to experimental physiology.

*Applied Botany*—a course of 30 lectures given to students taking the short course in Agriculture. The lectures deal with the following topics: principles of nutrition and growth; relations of plants to light temperature, moisture, etc.; forests and timber; propagation of plants; wounds and diseases.

In the academic year 1891-92 Professor Barnes discontinued the elementary course in botany and shared with Dr. Birge a year's course in General Biology. We learn from the catalogue that the course required 12 hours a week on the part of the student, and that in the first semester general principles of biology were studied for the first month, the remainder of the semester being devoted to botany. The second semester was given over entirely to zoology. Assisting in this course the catalogue lists Dr. Hodge as Instructor in Biology, and L.S. Cheney and R.H. True as Fellows in Botany. Several years later Cheney was appointed Assistant Professor of Pharmaceutical Botany, and True Assistant Professor of Pharmacognosy.

In 1893 Dean Henry of the Agricultural College took a very important step when he brought back to the University, with the rank of Assistant Professor, Dr. Harry L. Russell to take over the work in Bacteriology. Russell was born at Poynette, Wisconsin, in 1866, entered Wisconsin in 1884, and received the B.S. degree in 1888. He majored in biology and, having his interest strongly aroused by Dr. Birge's course in bacteriology, decided to make that subject his

life work. From 1888 to 1890 Russell held a fellowship at Wisconsin and continued graduate work, receiving the M.S. degree in 1890. There followed studies abroad at Koch's laboratory in Berlin, L'Institut Pasteur in Paris, and at the Zoological Station in Naples. He then returned to the United States and, completing the work for the Ph.D. degree at Johns Hopkins in 1892, accepted a fellowship in bacteriology at the newly formed University of Chicago. As has already been stated, in 1893 Dean Henry persuaded Dr. Russell to return to Wisconsin and take charge of the new department of bacteriology to be organized in the College of Agriculture, and also to carry on the courses in bacteriology in the College of Letters and Science which some years before had been started by Dr. Birge. In this manner began Dr. Russell's long and distinguished service to the people of Wisconsin and to the scientific world.

Professor Barnes remained at Wisconsin until 1898. In the latter year of his stay he offered an advanced year course, experimental in nature, in plant physiology for which chemistry and physics were listed as prerequisites. In the first semester the subject was "plant physics"; in the second semester, "plant chemics." It was in this field of plant physiology that he was destined to win distinction at the University of Chicago.

Barnes has been described by those who knew him as a scholar, an outstanding lecturer and teacher, and a man of high principles. Like many of his contemporaries he was broadly trained and one of his hobbies was the taxonomy of the mosses, a field in which he won national recognition. He served for several years as secretary of the faculty at its meetings, and played an important part in the discussions. It was an event at one of the faculty meetings that led to his decision to leave Wisconsin.<sup>2</sup> It seems that President Charles K. Adams was strongly interested in student athletics and a particularly zealous supporter of football. One spring, serious efforts were made by many of the faculty to get rid of an indolent football player whose sole interest was in athletics rather than study. A stringent resolution was passed which, if enforced, would prohibit the playing of any man whose standing was not up to grade. For some reason these resolutions were not presented by the President to the Board of Regents and hence did not have the force of law.

In November of that year a crucial game was to be played with Northwestern. One of the most important Wisconsin players was very delinquent in his studies. At a faculty meeting prior to this game the President explained that the faculty had enacted legislation that would bar the delinquent from playing, but that the resolutions had never been presented to the regents and, consequently, had no legal force; that he had talked with one of the regents who agreed there was no way to keep the man from playing; and that therefore he, the President, would assume all responsibilities and allow the man to play. He then attempted to dismiss the faculty saying, "That is all, gentlemen." But Professor C.R. Barnes, secretary of the faculty, was on his feet in an instant, and pointing his finger directly at the President said, "Mr President, did I not take those resolutions to you before the April meeting and ask you to present them to the board of

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<sup>2</sup>Condensed from recollection of Prof. E.B. Skinner as related to Charles Forster Smith.

regents? You did not do it. Did I not take them back to you and ask you to present them to the June meeting of the board? I want to know why this matter was not attended to!" The President replied, "Doubtless the superior memory of the Professor of Botany is correct." But the matter did not end there. Professors Turner, Parkinson and others deplored the situation and criticized the President's position. When the meeting finally broke up, it was evident that many members of the faculty had lost confidence in the President.

This incident led to a permanent break between Adams and Barnes, and years later the latter told Professor Skinner that it was one of the chief reasons why he left Wisconsin. In 1898 Barnes went to the University of Chicago as Professor of Plant Physiology and was succeeded in the same year by Robert A. Harper.

Harper was born at LeClaire, Iowa, in 1862. He received Greek and Latin at Gates College, Nebraska, 1886-88. He spent the year 1888-89 as a graduate student at Johns Hopkins; and at the close of that year went to Lake Forest Academy, Illinois as Instructor in Science. In 1891 he received an M.A. degree from Oberlin and became Professor of Botany and Geology at Lake Forest College. He continued graduate work at Bonn from 1894 to 1896, and in the latter year received a Ph.D. degree. He returned to his position at Lake Forest College until his call to Wisconsin. On arriving at Wisconsin, Harper carried on much of the work of his predecessor, but added new and important fields, such as cytology, mycology and plant pathology. He was aided by Assistant Professor Cheney who gave courses in anatomy and histology, trees and shrubs, and bryology; and by Instructor Timberlake who gave work on flowering plants. Harper was a scholar, a stimulating lecturer, and an active research worker. Under his leadership graduate students were attracted to Wisconsin, various lines of research were begun, and the department entered upon a period of growth and prosperity.

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