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WELLESLEY COLLEGE AND THE DEVELOPMENT OF BOTANICAL EDUCATION IN AMERICA[1]

IT is an honor for one to be assigned any part, however minor, in the exercises for which we have assembled to-day, and I am not insensible to the high honor of being invited to give the address this evening. The most significant distinction between man and the rest of creation is his intellect, and the most important matter that can ever concern us is the advancement and diffusion of knowledge. We are met this afternoon to dedicate a beautiful building to these uses.

I have been fortunate in knowing something of this building from the time when it existed only as a need, then as a dream, then through all the various stages of plans in mind, blue prints, bids and contracts, disappointments and delays which mark the construction of every building worth having—and now the welcome stage of a dream come true.

I had almost said, "the final" stage of a dream come true; but that would have implied a misunderstanding of the entire situation, for the completion of this building bears somewhat the same relation to the department of botany of Wellesley as the graduation of students from college bears to their life work—it is only a commencement. True it is not, if I may use a pleonasm, an initial beginning, but it marks the beginning of bigger and better things, not only for botany in Wellesley, but for botany in America, for whatever facilitates better work in any discipline, anywhere, is a benefit to all.

What has gone into this building? Brick and mortar, of course, as those can testify who have watched it rise from day to day. But more than brick and mortar. Aspirations and ideals, hopes and wishes, ability in planning, impatience at delays, discouragements vanquished by zeal and persistence, a determination to have the best in order that the best may be accomplished; love, devotion and sacrifice—the building is fairly held together by these imponderables more firmly than by beams and concrete.

I would like to emphasize, if I may, the comparison of this occasion to a college commencement, for just as commencement day has been preceded by years of activity and accomplishment that justify the final diploma, so this building has been preceded by years

[1] Address delivered at the dedication of the new Botany Building, Wellesley College, November 4, 1927.

of splendid accomplishment (in the study and teaching of botany) that fully justify it. In his "Address on University Education," delivered at the opening of the Johns Hopkins University in 1876, Huxley spoke as follows:

> I would say that whenever you do build, get an honest bricklayer, and make him build you just such rooms as you really want, leaving ample space for expansion. And a century hence, when the Baltimore and Ohio shares are at one thousand premium, and you have endowed all the professors you need and built all the laboratories that are wanted, and have the best museum and finest library that can be imagined; then, if you have a few hundred thousand dollars you don't know what to do with, send for an architect and tell him to put up a façade.

One could not truthfully say that all of the conditions laid down by Huxley as justifying a beautiful building have been here fulfilled, but enough of them have been met fully to justify this building.

It is true that Pasteur's early laboratory was an unhealthy cellar, that radium was discovered in an old shed, and that much of the world's scientific work has been poorly and inadequately housed, but there is no argument in all that. Men have attained the highest levels of religious experience in groves and tents, but I have never heard it argued that religion ever suffered by the building of beautiful temples, although such temples may at times have sheltered a worship wholly unworthy of shrine and worshipers.

If education and science are among the most important activities of the human race, they are worthy of being housed in as suitable and beautiful buildings as may be thought justified for business or religion. Beautiful architecture, like beauty in any form, is worth promoting for its own sake. Why should not beautiful buildings be planned for science and education?

I have referred to the gradual development here of the work for which this building is intended. Wellesley College was opened in 1875, at a period when botanical instruction in American liberal arts colleges was the exception rather than the rule, and when professors of botany were almost as scarce as blue roses. Asa Gray had studied and taught botany to the glory of Harvard College since 1842, but with the title "professor of natural history." He retired, two years before Wellesley College was opened, to devote himself to the herbarium and botanical research, leaving George Lincoln Goodale as professor of plant physiology and W. G. Farlow as assistant professor of botany.

At this time there were several men in medical schools teaching the specialized branch of botany known as materia medica, but so far as I can ascertain, there were (besides Farlow's at Harvard) only five chairs with the title "professor of botany," and only two more with the title "professor of botany and"—some other science, thus: Professors of botany: Edward Tuckerman, at Amherst, 1858; Daniel Cady Eaton, at Yale, 1864; William James Beal, at Michigan Agricultural College, 1870; Charles Edwin Bessey, at Iowa Agricultural College, 1870, and Sarah A. Oren, at Purdue University, 1875. Miss Oren was preceded in Purdue by John Hussy, who was professor of botany from 1875–1876. The other two were Albert Nelson Prentiss, professor of botany, arboriculture and horticulture at Cornell University, 1868, and Thomas Jonathan Burrill, professor of botany and horticulture at the University of Illinois, 1870.[2]

The botanists, Sereno Watson and Alphonso Wood, also flourished at about this time, but, so far as I can ascertain, not as professors of botany.

From the above information it will be seen that Wellesley was in the front rank of pioneers in America in the establishment of her chair of botany in 1878, and was probably the first woman's college in the world to have a separate chair. It is of special interest for us here that the establishment of a "school of botany" at Wellesley was a cherished hope of the founder, Mr. Durant.

It is perhaps not surprising to find this early attention to botany in a woman's college, for it is a venerable notion that botany is pre-eminently a study for women. Thus, as early as 1796, Jean Jacques Rousseau entitled his one botanical book, "Letters on the elements of botany addressed to a lady." In this book he stated his conviction that, "the study of nature abates the taste for frivolous amusements, prevents the tumult of the passions, and provides the mind with a nourishment which is salutary, by filling it with an object most worthy of its contemplations."

We should not fail to mention in this connection the splendid pioneer work in botanical teaching in the early years of the Troy Female Seminary (now known as the Emma Willard School). This school was founded in 1821, and as early as 1829 there was published (at Hartford, Connecticut) the first of several editions of "Familiar Lectures on Botany" for the use of higher schools and academies, by Mrs. Almira H. Lincoln, vice-principal of the seminary and teacher of botany there. The author states in her

[2] I am indebted to Dr. John Hendley Barnhart for the larger part of these data, but I have not made a sufficiently thorough search of the records to feel sure that I may not have omitted some professorship of botany established or filled in 1875. The years given above for each name are the years when the incumbents were appointed.

preface that the book was the outgrowth of some years of instruction of large classes in botany. We may infer, therefore, that botanical instruction was organized at the Troy Female Seminary at least prior to 1829, and over thirty years before the establishment (in 1858) of the first chair of botany in an American college.[3]

I believe that no botanist giving this address could resist the temptation to quote from Mrs. Lincoln's book:

> The study of botany seems peculiarly adapted to females; the objects of its investigation are beautiful and delicate; its pursuit leading to exercise in the open air is conducive to health and cheerfulness. Botany is not a sedentary study which can be acquired in the library; but the objects of the science are scattered over the surface of the earth, along the banks of winding brooks, on the borders of precipices, the sides of mountains, and the depths of the forest.

This would seem to imply that the early botanical work of the Troy Female Seminary was largely of the nature of what is now known as ecology, and one may picture classes of females, far huskier than we usually associate with that epoch, climbing steep banks and mountains, and pushing their way through the underbrush of dense forests in search of specimens and knowledge. The picture is not over-drawn, for in the catalogue of 1844–45 the "Report of the Committee of Examination" of the school, reads, in part, as follows:

> The class in botany we consider especially deserving of praise. We could not only judge of their proficiency by their familiarity with their text-book, but their knowledge was put to a practical test by the actual analysis of plants and flowers. This they did with a fluency and accuracy that gave most conclusive evidence of their own diligence and their teacher's faithfulness. Each young lady had an herbarium in which were pressed and tastefully arranged from 100–300 specimens, all labelled according to their classes, orders, genera and species. These have all been collected and arranged during the term, and mostly in the immediate vicinity of Troy, at no greater distance than would suffice for a morning walk or an afternoon ramble. In climbing hills and threading woods and valleys in search of flowers, the young ladies together with instruction have gathered strength, health and beauty.
>
> The study of botany seems to be peculiarly appropriate for women. Her skilful and tasteful hands find a pleasing task in the cultivation of flowers. Wherever we see the windows filled with the most beautiful flowers, native and exotic, the columbine trailing its vines over the portico, the garden walk fringed with violets, and shaded with roses, we there recognize the finger of woman, and look for the abode of neatness, order, cheerfulness and virtue. In all ages flowers have been made the objects of her care and the emblems of her purity and beauty.

Here we have an early expression in America, of the notion, once more prevalent than now, that botany is essentially a study for females. No misconception ever died harder; it is not dead yet, but like most erroneous ideas, it persists only among persons whose information does not entitle them to hold any opinion on the subject.

But from the above quotation, the fact emerges that instruction in botany was given by a woman in one of the first schools for women to be established in America.

As early as 1873 courses in botany (Gray's Botany) were given at Mount Holyoke Female Seminary by Miss Henrietta Edgecomb Hooker,[4] but Mount Holyoke was not chartered as a college until twenty years later. Without investigating the matter further, I hazard the guess that the courses given by Mrs. Lincoln at Troy were the first (or one of the first) courses in botany to be given by a woman in any country. In harmony with this fine tradition, Article VI of the By-Laws of Wellesley College states that the college shall provide instruction in botany. The first professor of botany, Susan Maria Hallowell, was at first professor of natural history—from 1875 to 1878. In 1878 she became professor of botany, and the college calendar for 1877–8, under the heading "Instruction in botany," outlines the subject-matter to be covered, and contains the following paragraph:

> Students are encouraged to make independent observations and self reliant researches; and, avoiding hasty inferences from partial data, to form judgments of things noted, and correctly describe the results of their observations. To secure this end, they are instructed in the best methods of study and observation.

That is a rather remarkable statement, considering the year in which it was published, and is evidence that Wellesley College was one of the pioneers not only in having a separate department of botany, but in emphasizing that something should be acquired by the study of botany besides information about plants, and in introducing the laboratory method of instruction in undergraduate courses.

Harvard appears to have been (in 1872) the first American college to introduce laboratory work in undergraduate instruction in botany. The following year Professor Charles E. Bessey required laboratory

[3] The Catalogue of the Troy Female Seminary for 1839–40 specifies an additional special charge of three dollars a term for students taking botany. This appears to be one of the early instances in America (if not the earliest) of a laboratory fee in botany.

[4] Her name appeared in the *Thirty-ninth Annual Catalogue* (*1875–76*) as Miss Etta E. Hooker.

work in the undergraduate courses at the Iowa Agricultural College, at Ames, without knowing that this had been done the year before at Harvard. Wellesley, therefore, was among the very first colleges in the world to adopt in undergraduate botanical instruction the only rational method of education in any science.

Appleton's "American Cyclopaedia," edition of 1881, in the article "Wellesley College," states that:

> The grounds comprise 300 acres, including a greenhouse, from which the students are supplied with flowers for their botanical researches.

Further on, in the same article, we read that,

> Wellesley College was established to give young women opportunities for a collegiate education fully equal to those provided for young men. It is arranged for collegiate methods of instruction only, and *for courses of difficult study.*

From the italic words it is evident that botany was no snap; but in the presence of my contemporaries—both students and teachers—I will not dwell on the continuity of this reputation, so splendidly maintained from the beginning until the present moment.

This period should not be passed over without a word of appreciation of the substantial pioneer work of Professor Hallowell, so fittingly commemorated during the current year by the endowment of the Susan M. Hallowell chair of botany.

I am still full of the enthusiasm engendered by my visit one year ago through the botanic garden and arboretum of Wellesley College. What a magnificent opportunity would have been lost if a portion of this beautiful campus had not been set apart for a botanic garden! The opportunity amounted to an obligation; the plan is admirable, and the present accomplishment a matter for congratulation, not only to the department of botany, but to the college as a whole, to the local community and to the botanical world.

When one contemplates the unique educational values of museums and botanic gardens, it seems strange indeed that they have, in America at least, almost without exception, developed independently of colleges and universities. In the old world, botanic gardens commonly developed as adjuncts to university botanical instruction—as at Pisa, Genoa, Amsterdam, Oxford, Cambridge and elsewhere; but even in the old world the outstanding botanic gardens developed as institutions wholly or largely independent of colleges, as, for example, the Chelsea Physic Garden, the Jardin des Plantes and the gardens at Berlin, Kew and Buitenzorg. In America the botanic garden of John Bartram (Philadelphia, about 1730), the Elgin Botanic Garden of Dr. David Hosack (New York, about 1801), the new California Botanic Garden (established this year), and the Missouri, New York and Brooklyn gardens, all developed as independent institutions, although affiliations have been established between the last three and local universities. Among university and college botanic gardens may be mentioned those at Harvard, the University of Pennsylvania, the Johns Hopkins University, Michigan Agricultural College, and more recently those at the University of Michigan and Stanford University. Among women's colleges the botanic gardens of Smith and Mount Holyoke are perhaps most widely known.

One of the best wishes I can give for Wellesley College is the early and vigorous development of its botanic garden and arboretum, and the organization of its courses of instruction in a way to make the fullest use of them.

Out of his wisdom and wealth, Aristotle endowed (at Athens) the first botanic garden of which we have record. From that day to the establishment of the Brooklyn Botanic Garden in 1910, the endowers of botanic gardens appear to have been men. The fashion of women benefactors, set by Brooklyn, soon began to spread. In 1914 Miss Susan Minns, of Boston, a student (together with Miss Hallowell) of Agassiz and of Gray, made a contribution of $50,000 toward the construction of a new botany building. This fund had increased to $80,000 by the time the new building was begun. In 1921 Mrs. Cordenio A. Severance (after the death of her husband) generously doubled an endowment fund which Mr. and Mrs. Severance had previously given for the botanic garden, now known as the Alexandra Botanic Garden, in memory of their daughter, the total endowment being $30,000.

In 1923 Mrs. Robert Shaw, of Wellesley, gave to the college a substantial fund in memory of her father as an endowment for the Horatio Hollis Hunnewell Arboretum, and additional funds for the initial work of development. In June of this year (1927), Miss Minns made another liberal gift of $11,000 as an endowment fund for the Hallowell Memorial Library, wisely specifying that the income from this fund is to supplement, but not to replace, the annual appropriation from other college funds for the botanical library. Mention should also be made of the recent generous gift of Dr. John Farwell of $100,000, to establish, in memory of his wife, the Ruby Frances Howe Farwell chair of botany.

To announce these facts here and now is taking coals to Newcastle, but to one who, like the speaker, has devoted much of his time and effort for a number of years endeavoring to secure more nearly adequate funds for botanical science, it is a source of gratification and pride to proclaim such benefactions as these.

Lest any one may feel that I am wandering from the dedication of the new building, let me emphasize the fact that a botanic garden is indispensable for the highest accomplishment in the work for which this building is intended.

The Elgin Botanic Garden, to which I referred a moment ago, was one of the earliest botanic gardens in America. It was established and maintained by Dr. David Hosack immediately after his appointment, in 1795, as the successor to Dr. Samuel L. Mitchill, the first professor of botany in Columbia College. In a pamphlet on "The establishment and progress of the Elgin Botanic Garden (New York, 1811), Dr. Hosack quotes from the *Transactions* of the New York State Agricultural Society for 1794, as follows:

> The establishment of a garden is nearly [i.e., closely] connected with the professorship of botany under the college, and the lectures on that branch must be always very lame and defective without one.

Then, referring to his appointment as professor of botany, he continues:

> I now readily perceive that an abstract account of the principles of these sciences (botany and materia medica), as taught by books, coloured engravings, or even with the advantages of an herbarium must necessarily be very imperfect and unsatisfactory, when compared with the examination of living plants, growing in their proper soils, with the advantages of culture; that a study, in itself both highly useful and agreeable, was necessarily rendered uninviting from the manner in which its principles were illustrated, and that a botanical establishment was indispensably necessary in order to teach this branch of medical science with complete effect.

After endeavoring to teach botany for two years and a half without a botanic garden, Dr. Hosack, in November, 1797, presented a memorial to the president and board of trustees of Columbia College, urging them to provide a botanic garden. "Since I have had the honour of an appointment to this professorship," he said, "it has been to me a source of great regret that the want of a *Botanical Garden,* and an extensive Botanical Library, have prevented that advancement in the interests of the institution which might reasonably have been expected."

In these quotations we find not only the germ of the once famous Elgin Botanic Garden, but one of the earliest expressions in America of the great importance of a botanic garden for the most effective teaching of botany.

It were possible, to be sure, to lay out this or any other college campus purely from the standpoint of beautiful landscape effect without any regard whatever for the botanical affinities of the trees and shrubs, or the accomplishment of any but esthetic results. And beauty, of itself, is educative. But there is a type of beauty often lost sight of by artists (or by those who are merely artists), which consists in the perfect adaptation of a thing to its uses (such, for example, as the perfection of the floral mechanism of orchids to secure insect pollination), or the utilization of a thing to the full extent of its capacities (such, for example, as the playing of an organ by a master). One who comprehends the morphology of an orchid flower can see in it immeasurably more beauty than one who sees it only as a pleasing combination of color and form. So a college campus, laid out as a botanic garden without sacrificing its landscape effects may serve science and art and education. It possesses a manifold beauty because it serves a multiplicity of ends. And it would seem almost incredible that an educational institution should not be keenly interested to make its campus (as well as its buildings) yield the fullest possible educational returns.

But what *is* the purpose of this building? "For the teaching of botany," you say. Emphatically, no! It will be used for that, but its purpose is education through botany. One of the greatest of modern fallacies is the idea that students go to college primarily to learn. (I am told that this fallacy now has few adherents in the student bodies themselves!) This idea underlies all the present-day talk about vocational training in our colleges. Four years of college should contribute toward fitting graduates to follow successfully some vocation, but the chief purpose of our undergraduate liberal arts college is to educate; education and learning or training are not synonymous.

Just as the purpose of the college is to educate, so the ultimate purpose of every course of instruction in every subject should be the education of those who pursue the subject. To learn about plants is one thing; education through botany is quite a different matter, a more serious matter, a vastly more important matter. How completely this conception of the function of botany in college instruction was recognized in Professor Hallowell's 1878 announcement, quoted above! This department of botany and this college may well be proud of that statement.

I shall not vie with Spencer and Huxley and others in attempting to define education, but it is a self-evident truth (except to those who lose sight of it!) that one may be a walking cyclopedia of information about plants, and yet, every time he writes, or enters into conversation, or passes judgment (so-called), or states his opinion, or evaluates issues, or discloses his taste, or reveals his understanding (or the lack of it) of the relation of botanical knowledge to knowledge as a whole, and its significance in the history of civilization and in modern life, he may reveal a lack

of education more clearly than he reveals his knowledge of plants.

If this building is to be devoted only to teaching people botany, the money could have been better expended; if it is to be devoted to education through botany, the money could not have been spent to better purpose.

What are the educational values to be derived by the study of botany? In the first place, the student will learn whether or not botany is his major interest in life. This is the most important and most vital question to be answered by the four undergraduate years of college. "What is my major life interest?" Not until this question is satisfactorily answered can the most effective education even begin.

I had the pleasure of teaching beginning botany for about ten years, and after a few preliminary years, while I was learning much more than I was teaching, I began to say to the students, at the last meeting of the class, something like this:

> I know perfectly well that some of you are delighted beyond words that this is the last meeting of the class, and that you will never take another botany course, nor read another book on botany, nor ever again glance at a plant except as an object of beauty, so long as you live, if you can avoid it. If you have discovered that this is your attitude toward botany, you could not have made a more vital discovery. The next most important thing for you to find out is this: "What subject does appeal to you more than any other, so that you shall want to elect all of it you are allowed to in college, and devote the best of yourself to its pursuit thereafter."
>
> Some of you have discovered that, until you began the study of botany, you were never really interested in anything before. You thought you had been interested, but you find you were mistaken. Your keenest regret is that the course is over, and you mean to elect all you have time for in college, to specialize in some branch of botanical science for your major post-graduate study, and to devote your life to the study and teaching of botany. You, too, are to be congratulated, not because you have discovered that botany is your life interest, but because you have discovered what your major interest in life is.

More surprised classes I never saw than those who listened to that statement. Congratulations from the "Prof" that they find they do not like his subject! One who is merely giving instruction in botany could never see his work from that angle; one who teaches botany as an educational discipline could never see it from any other. The former always regards his introductory course merely as a preparation for advanced courses; the latter regards it as an introduction of a developing mind to a new realm of thought, which may or may not make a strong appeal. But a course planned with the latter thought in mind should and will serve as one of the best possible preparations for advanced courses, should his students wish to elect them.

In common with other sciences, botany when properly taught is also peculiarly fitted for teaching people *how* to acquire knowledge and *how* to think. As I have emphasized elsewhere, the great lesson to be learned from the recent science-and-theology flare-up is that most people do not know *how* to think. They hold firmly to opinions and cherish prejudices, but they have not the most elementary conception of how a scientist proceeds in the acquisition of knowledge and the formulation of general notions and principles.

Again the ramifications of botany into other sciences, and into non-scientific disciplines, such as history, art, religion, social customs, commerce, literature, and others, qualify it to be, if one desires, a central motive in a program of education. For example:

The most widely disseminated of all human races has, for several thousand years, celebrated a feast with unleavened bread because its ancesters, on one of their famous racial migrations set out on their journey so hastily that they forgot to take with them a supply of tiny microscopic plants, without which bread is unleavened. An entire nation of American Indians has developed its culture around the Indian corn or Maize as a motive. The culture of another group centers around the acorn.[5] The cultivation of plants marks the beginning of fixed habitations, an absolutely essential condition for the development of civilization. The growing of cultivated plants is the foundation of industry and commerce. One can not follow out the botany of the objects in any living-room without being brought into contact with nearly every continent and nearly every clime. For botany is more than morphology and physiology, taxonomy and ecology, anatomy and cytology. The study of botany and the history of botany would afford as liberal an education as the study of any "five-foot shelf of books," and would afford certain educational results that could never be obtained by the reading of any number of lineal feet of printed matter.

Why is it that the history of botany (and of other sciences, for that matter) is so seldom taught in our colleges? What an educational opportunity is being missed! To one who knows the fascinating interest of the subject, its cultural value, the importance of its lessons for everyday thinking and judging, and the flood of light which it throws on modern science

[5] Two interesting rooms in the Brooklyn Museum are devoted to exhibits illustrating these two types of primitive culture.

and other departments of thought, the general neglect of the history of science in our educational programs is difficult to understand. In the Wellesley College *Calendar* for 1926–1927 courses of instruction are listed in 27 disciplines, of which 18 are non-scientific and 8 scientific. With the exception of Logic and Psychology, Philosophy, Reading and Speaking, and Spanish, courses in the history of the various subjects are offered in all the non-scientific disciplines, varying in proportion from 9 historical courses out of 11 in Art to one historical course out of 45 in Physical Education. In Mathematics one course out of 18 is historical. The department of History offers courses in almost every aspect of human activity, but no course in the history of science. However, such courses belong properly under the various sciences.

In the eight natural and physical sciences, historical courses are offered only in astronomy.

These data are assembled from the Wellesley College Catalog, not with any thought of criticism, but merely as the most appropriate concrete example (on this occasion) of a condition which is almost universal in American collegiate education.

The fact emerges that our colleges are neglecting one of the most valuable aspects of human thought and endeavor, and science is needlessly impoverishing itself as an educational discipline. Will Wellesley College not wish to be one of the leaders in correcting this educational defect, just as it was a leader in its early years in the introduction of laboratory work, and in other aspects of higher education?

Not more than fifty years ago, when science was only an entering wedge in the college curriculum, the protagonists of the older disciplines were accustomed to speak of the classics and other non-scientific studies as "the humanities" in contrast to the sciences, which were not then recognized as possessing humanistic values. But in 1919 Sir William Osler, Regius Professor of Medicine at Oxford, delivered his presidential address before the Classical Association. In this address on "The Old Humanities and the New Sciences," Osler elaborated the humanistic value of scientific studies in a program of education. "Our wonder at the extent and variety of the knowledge demanded by the school of *Literae Humaniores,*" says Sir William, "pales before the gasping astonishment of what is not there. Now and again a hint, a reference, a recognition, but the moving forces which have made the modern world are simply ignored. Yet they are all Hellenic, all part and parcel of the humanities in the true sense, and all of prime importance in modern education."

Possibly, as Osler suggests, the elimination of most of the science from the classical curriculum is due to the fact that the intellectual treasures of Greece and Rome were transmitted to us through ecclesiastical conduits and sieves, and only that was allowed to pass which was considered of interest and importance. Whatever the explanation, the classical student is incredulous (if not indifferent) when told that Aristotle founded the first botanic garden of which there is record, that he endowed it in his will, and that he was primarily a biologist. Those of us who prepared for our scientific careers by four or more years of classical studies in the last quarter of the nineteenth century learned almost everything of Theophrastus, a pupil of Aristotle's, *except* that he was, in the judgment of some writers, the founder of modern botany, and the director of the botanic garden established at Athens by Aristotle.

I refer to these facts because they emphasize in a striking way that, if we follow out the history of such a science as botany, we are taken straight to the heart of the old humanities; the cleavage between the sciences and the humanities vanishes—the sciences become humanities.

Says a recent writer in the English periodical, *Nature:*

"As a medium of culture, the history of scientific discovery opens up to the imagination vistas of man's endeavor which place it in the front rank of humanistic studies. *But,*" he continues," we doubt, however, whether much of the science teaching in schools, either primary or secondary, could be regarded as science for citizenship instead of science for specialists, and we should welcome a movement which would broaden its scope and change its character."

Here is the great opportunity for the liberal arts colleges, such as Wellesley, to regard the purpose of most of their courses to be primarily the *education* of their students, not the training of specialists. There is perhaps no greater need in our nation to-day than men of broad, scholarly education, whether or not they possess in addition the technical training fitting them for some profession.[6]

And now I have tried your powers of endurance and courtesy to the very limit, with scarcely a word about research. In the back of my own mind research has been taken for granted as the indispensable foundation and inspiration of teaching. How can one teach who isn't a student? He could only hear recitations—or, what is worse, give lectures—when he ought to be inspiring others to study. If one wishes to get a real thrill, let him discover a new fact or principle. We are all familiar with the classic story

[6] The educational importance of the history of science is emphasized in Paper No. 8 of the Report by the Adult Education Committee of the Board of Education, entitled, "Natural Science in Adult Education," London, 1927.

of Archimedes, running fresh from his bath through the streets of Syracuse, shouting *"Eureka, eureka,"* in his joy at having discovered the principle of specific gravity. We are told that Newton was so overcome with emotion, when he saw that his calculations on gravitation were confirming his hypothesis, that he could hardly hold the pencil to finish the equations. When Pasteur showed Biot how to make dextro-tartaric and laevo-tartaric acid, Biot exclaimed, "My dear boy, I have loved the sciences so much all my life that what you show me makes my heart thump." When Davy discovered the metal potassium he danced about his laboratory in high glee, and was too excited to continue his experiments.

The best thing I can wish for this building is that its laboratories may be the scene of many heart thumps (over science!), and of many ecstatic dances (over the discovery of truth!).

Wellesley is a college, but that is no reason why the teaching which is, perhaps, its main function, should not rest upon the solid foundation of research in progress. It is a truism that nothing is more wholesome for a college nor more stimulating to a student than an atmosphere of research penetrating laboratories and classrooms and campus. Nothing could be more unfortunate, from the standpoint of education, than to have a student, after four years of undergraduate residence, leave a college with the impression that any department of knowledge, and in particular, any science, is static—a finished product.

It was Frederick the Great who said: "The greatest and noblest pleasure which men can have in this world is to discover new truths; and the next is to shake off old prejudices." What a wonderful privilege to be able to study and teach! What a fine thing it is to provide a building and equipment devoted to the advancement of science and of education through science!

I congratulate this Department of Botany, I congratulate Wellesley College, I congratulate the botanical and educational world on this splendid opportunity and the correspondingly great responsibility.

C. STUART GAGER

BROOKLYN BOTANIC GARDEN

NEUROLOGY AND THE TEACHING OF MEDICINE[1]

To be the orator of the day on an occasion as important as this is to feel at once uplifted and cast down; by the honor one is raised, and by the sense of inferiority one is made to realize that indeed one is much lower than the angels. Graduates in the humanities, you, our new friends, are Freshmen in medicine—some of you have come because throughout your life you have been shapen in medicine, you have felt a driving urge which bade you examine the living things around you, be interested in the vagaries of the people you knew—may be, however, some have chosen this arduous trade because their fathers before them plied it and they count on his name and favor as aid and comfort for the hard launching in a not entirely appreciative world. A handicap this almost —for the spirit of practice comes only from within; an aptitude, a power to learn, may be inherited but to try to follow exactly the steps of one's father is perhaps to court the fate of Icarus. The wings with subtly-blended wax fastened on his shoulders were those which his father Daedalus had fashioned and by them he had been borne aloft. These wings lifted the ambitious Icarus, but the sun, you remember, melted the wax and he fell into the Aegean Sea—so the adventure and attrition of Practice may be the solvent of such wings; for it is the man himself, his sure selection of essentials, his ready grasp of problems, the skill of his hands, his humor, his instinct for the problems of others rather than his own, his love of the weakness of humanity as well as its strength; his pity for frail, great-brained, great-hearted, things like ourselves caught in the wheels and hammers of biological law. These are inborn and can not be transferred by will or directed in action—and they are the very stuff of happy and useful living. Those men who have a call for medicine have these qualities or most of them, but to those who doubt themselves—and who does not?—we would say that hard work will bring greater results here unaided by great brilliance of intellect than in any other profession.

Do you remember how Lydgate found that he must go doctoring—this in George Eliot's novel "Middlemarch":

> One vacation, a wet day sent him to the small home-library, to hunt once more for a book which might have some freshness for him; in vain! unless indeed he took down a dusty row of volumes with grey paper backs and dingy labels—the volumes of an old Cyclopedia which he had never disturbed. The page he opened on was under the head of anatomy and the first passage that drew his eyes was on the valves of the heart. He was not much acquainted with valves of any sort but he knew that valvae were folding doors, and through this crevice came a sudden light startling him with his first vivid notion of finely adapted mechanism in the human frame. The moment of vocation had come, and before he got down from his chair, the world was made

[1] An address at the opening of session, September, 1927, Cornell University Medical College, New York City.