THE IDEALS AND OPPORTUNITIES FOR A BOTANIC GARDEN[1]

I HOLD in my hand a rare and, especially on this occasion, exceedingly interesting little volume. Its title is "Address at the Inauguration of the Hunt Botanical Garden, in Brooklyn, N. Y.," delivered in the Athenæum at the vernal exhibition of flowers of the Brooklyn Horticultural Society, on the evening of April 11, 1855, by Francis Vinton. Sixty-two years ago, almost to a day was inaugurated the first effort to establish a botanic garden in Brooklyn.

Apparently no enterprise could have been launched under more auspicious circumstances. Thomas Hunt, after whom the Garden was named, endowed it with fifty thousand dollars in money and one third of the ground which the garden was to occupy, estimated to be worth at that time ten thousand dollars. This was a large endowment and a specially munificent gift for the year 1855.

In addition to Mr. Hunt's endowment, William C. Langley, Esq., gave one third of the land and five thousand dollars in money, while Henry A. Kent, Esq., gave the remaining third of the garden plot and twenty-five hundred dollars in money. The total value of the endowment, in money and land, was thus $87,500, or nearly $10,000 more than the endowment of the Brooklyn Botanic Garden after seven years of existence.

Said the optimistic orator on that occasion:

> Let this night of the inauguration of the horticultural garden ever be the anniversary of the successful enterprise that, year after year, shall bless, more and more, the young and the aged, the rich and the poor, young men and maidens, old men and children, parents and friends, to the latest generation.

Alas, for the best laid plans of mice and men! The institution, apparently so firmly established, proved to be, not a perennial, but an annual plant. At the close of one year, owing to a combination of circumstances, the land (located on Fifth and Sixth Avenues, between 57th and 60th Streets) and also the cash endowments, reverted to the original donors, and the Hunt Botanical Garden has perhaps never been publicly heard of in Brooklyn from that year until the present moment.

The institution whose main building we dedicate to-night is the third botanic garden projected within the city limits of Brooklyn. The second one is designated and laid out in the original plans for Prospect Park, but so far as I can learn, its realization was never attempted.

As President Healy has already noted, the first suggestion for our institution came from the late Professor Franklin W. Hooper, but the idea of having it administered as a department of the Brooklyn Institute of Arts and Sciences, in cooperation with the city of New York, was made by Mr. Alfred T. White, chairman of the Botanic Garden Governing Committee of the Institute trustees. Not the least of my pleasures in giving a brief address this evening is to make grateful public acknowledgement, not only of the generous gifts of Mr. White and his two sisters, but of his untiring devotion to the interests of the Garden, and his personal interest in and attention to everything that concerns its welfare, and especially its usefulness to this community.

The first rough plans for the laboratory building and plant houses were prepared by the present director of the Garden at Columbia, Missouri, in January, 1910, and submitted to the architects, Messrs. McKim, Mead & White for study and elaboration.

The appointment of the director, made in February, 1910, took effect on July 1 of the same year. On the fourteenth of the

[1] Address at the dedication of the laboratory building and plant houses of the Brooklyn Botanic Garden, April 19, 1917.

preceding February the Board of Estimate and Apportionment of the city of New York was requested to issue corporate stock of the city for the erection of the building, and the plans and specifications for the first section were advertised for public letting during October and November, 1911.

On January 18 the contract was awarded to Cockerill & Little Co., the lowest bidders. The building was to be completed in 150 working days from April 1, 1912. Excavation began on April 8, but owing to numerous exasperating delays the Garden staff was not able to occupy the first section of the building until September 24, 1913, approximately one year after the date specified for the completion of the contract.

The work of the Garden, administered for over three years from a temporary office in the Brooklyn Museum, had reached such proportions that the small first section was quite outgrown before it was occupied. The small plant houses became greatly overcrowded, both with plants and with classes; our one lecture room and class-room made it possible for us to respond to only a fraction of the demands made upon us by the schools and the general public; part of our library and thousands of specimens of our herbarium were packed away in storage, inaccessable for daily use; of laboratory accommodations we had almost none; further growth was impossible, stagnation was out of the question, for the Botanic Garden was a living institution, young and vigorous.

The state of the city's finances, resulting from the enormous cost of necessary public improvements, made it necessary for the most efficient board of estimate and apportionment the city has ever had to administer the public funds with the strictest economy, making appropriations of corporate stock only for necessary or very urgent purposes. This was the situation confronting our garden in May, 1915, when the chairman of our governing committee, realizing the urgency of our need, and believing firmly in the value of our work to this city, as well as to education and science in general, secured private funds to the amount of $100,000 on the condition that the city appropriate corporate stock in the same amount for the completion of our buildings, and other permanent improvements of the Garden. The terms of the gift were accepted by the city administration, the corner-stone was laid just one year ago to-morrow (April 20, 1916), and to-night we dedicate the building.

One can not help but recall at this time how very recent is the development of scientific laboratories. By whatever way you come to this building this evening you were dependent for your transportation upon an electro-magnet; electro-magnetism was discovered by Faraday in 1831, and the laboratory in which he worked was the only research laboratory then in existence. The epoch-making discoveries of the great French physiologist, Claude Bernard (about 1870), were made in the damp, unsanitary cellars of the Collège de France. It was indeed impossible, says M. Vallery-Radot, to dignify these cellars by the name of laboratories; Bernard himself called them "scientists' graves"—a prophetic name, for it was Pasteur's opinion that the disease which caused the death of Bernard was induced by the unhealthful conditions in which he was obliged to work. The laboratory of the Sorbonne was equally bad, dark and damp, and several feet below the level of the street. As late as 1871[2] there

[2] The first botanical laboratory in the United States for undergraduate instruction was introduced at Iowa Agricultural College (Ames) by the late Professor C. E. Bessey, in 1873. The laboratory method for advanced students is said to have been introduced the year previous at Harvard, but this was unknown to Bessey.

was no botanical laboratory of any sort in the United States. The museum and laboratory building of our sister institution, the New York Botanical Garden, completed in April, 1901, was the first building of any considerable magnitude in this country constructed for the sole purpose of botanical instruction and research.

What a change, and what an appropriate and heartening change, in the past twenty-five or thirty years, for now all of our better colleges and universities are planning adequate housing for their botanical work, and in many institutions this ideal has already been realized.

As many of you have already seen, the architects have made this a building of great beauty. A well-known magazine recently published a view of the Woolworth building, in New York, entitling the picture "a cathedral of commerce." And why should not commerce, and science which promotes commerce, have their beautiful buildings? Nothing has done more to give us a deep insight into divine mysteries, to correct false notions of deity, to produce a sane and wholesome attitude of mind toward the universe and man's relation thereto than the study of science, especially during the past fifty years. I like to think that there is something truly significant in the fact that the architectural motive of this laboratory building was drawn from churches such as are not uncommon in northern Italy.

But what is this building for, and what is a botanic garden? A botanic garden is an institution for the advancement and diffusion of a knowledge and love of plants; the particular purpose of the Brooklyn Botanic Garden is the advancement of botany and the service of the city.

But how, you ask, can a botanic garden serve the city? Without hesitation I reply, primarily by the advancement of botany, secondarily in many related ways. How the means indicated are adequate to achieve the result is still not clear to those who are inclined to think of botany, not as a man's work, as a science fundamental to the oldest and most essential of all human occupations, namely agriculture, but merely as a pleasant pastime for young ladies in a "finishing school," or as a rather heroic method of learning to recognize a few native wild flowers and to pronounce their Latin names. My time is too short and the hour is too late for me to go into details, but I may briefly illustrate by citing a line of work now in progress here, namely, a survey of the diseases of the trees and shrubs of Prospect Park and the Botanic Garden. During the past ten years the boroughs of Brooklyn and Queens have lost chestnut trees to the value of several hundred thousand dollars through the ravages of a tree disease which no one knows how to combat. Would it not have been worth much more than the annual cost of maintenance of both botanic gardens of the city to have known how to check the chestnut blight, and how to cope with equally destructive diseases now threatening several other kinds of trees?

But of far greater importance than a knowledge of how to grow trees in a city, or how to combat the diseases of crop plants, is the instilling in the general body of our citizens of correct habits of thought and a correct attitude of mind in the face of such problems. To observe accurately, to record faithfully, to reason logically, to keep an open mind, to welcome truth regardless of consequences, quickly to recognize error, to make no compromise with charlatanism—this is the scientific habit of thought and work. It is the only method by which knowledge is advanced; it characterizes all research in this and similar institutions; it is the indispensable spirit of all scientific instruction, both elementary

and advanced; *it is the greatest educational need of to-day.*

Never more than now was our educational atmosphere so surcharged with a clamor for "efficiency," which, in many minds, is synonymous with the idea that the chief end of education is to enable one to get a living. But the scientific habit of mind, briefly outlined above, equips one, not only to get a living, but to live. To belittle the importance of equipping our youth to succeed in some vocation would be folly; it is greater folly not to recognize the importance of equipping them to spend their hours of recreation in something more wholesome and beneficial than movies and cheap vaudeville.

To educate one to think straight and to keep his thoughts in the realm of the useful and beautiful is of more fundamental importance, is more "practical," if you please, than any other end to be sought by education. The knowledge to be obtained by nature study and the study of botany is of large importance, but the by-products of these studies, as here indicated, are the larger values. The work of public instruction as organized at the Brooklyn Botanic Garden affords an additional opportunity for our citizens to obtain such advantages —knowledge in which they are interested so presented as to bring pleasure, to build character, and, in many cases, to serve as the foundation of a successful life work. This is preparedness of the most thoroughgoing sort, for it not only goes to the root of things, but it serves the nation at all times and under all circumstances, in peace as well as in war.

Two writers in a late number of SCIENCE,[3] discussing the recent debate in the House of Lords between Lord Haldane (*pro*) and Lord Cromer and Viscount Bryce (*con*) on the extension of science teaching, and the place of science in education, call attention to the fact that "science is *finding out* and *learning how*," and is not to be thought of in terms of its results. Any system of education that does not provide ample opportunity for training in finding out and knowing how is fundamentally faulty. It is the duty of every state, of every city, to see that its educational system makes suitable provision for this kind of discipline.

Such opportunities, within the realm of botanical science, are afforded at the Brooklyn Botanic Garden by our own classes, taught by members of the Garden staff, by lectures and nature stories for adults and children, and by opportunities afforded here for teachers of the public and private schools of Brooklyn to bring their pupils for a first-hand study of plants in field, conservatory and laboratory. When a boy comes to the Botanic Garden regularly every Saturday for a year or more, clear from Staten Island, a round trip journey consuming from three to three and a half hours, one may be sure that what he receives here partakes of the nature of fascination, and possesses unmeasured importance in the making of his character and in his preparation for a useful career. This is only one illustration of many that might be given, of how our work is appealing to an increasingly large number of young people.

As a result of the present international situation there is now a widespread movement to bring all available land, especially in cities, under cultivation. This phase of preparedness was inaugurated in Brooklyn by the Botanic Garden some three years ago by the starting of back-yard gardens, and the distribution of penny packets of seed. During the past three years we have distributed over 311,000 penny packets of seeds to the children of Brooklyn, and have inaugurated and inspected from 1,200 to 1,400 back-yard gardens. With the more ample quarters made available by our com-

[3] SCIENCE, N. S., 44: 841–844, December 15, 1916.

pleted building, opportunity is afforded for the expansion of this work several fold.

A brief word for scientific research and I am done. There is now nearing completion in this city one of the most stupendous works of engineering ever brought to a successful completion. I refer to the new water supply system. But what would the city say to the proposition that it should confine all of its efforts to building the conduit for this water, and should leave to some other city, or to some county, or to the state, the expense and the work of providing the reservoir and keeping it adequately supplied with water? The answer does not need to be stated.

But now transfer the simile to education. What a sorry spectacle would be an institution such as ours, calling itself educational and scientific, and yet content to be merely a conduit of information procured from a fountain head located elsewhere, and to which it made no contribution. It is the supreme—the supreme—business and duty of an institution like this, to be creative, productive; not merely a purveyor—a channel of distribution. Our debt is to science as well as to the people. We owe it to the people to disseminate knowledge; we owe it to science not to be parasitic on the body of knowledge, but organically connected with it in a relationship of mutualism—of mutually advantageous symbiosis—giving as well as receiving, constantly enriching the storehouse from which we draw. This is the only relationship which makes for healthful vigor, for perennial enthusiasm, for largest accomplishment, for the most valuable and solid service to the community. Does the great metropolis of New York wish otherwise—wish less than this for its educational and scientific institutions? I believe it does not. We are now living in the early years of an epoch when municipal support of the important work of finding out and learning now is to be considered as important and proper a function of municipal government as acquiring water sites and building aqueducts.

In a recent address on "The Support of Scientific Research in a Democracy," Professor James McKeen Cattell called attention to the fact that the manufactures of the city of Pittsburgh and Allegheny county are worth more than three hundred million dollars a year. These manufactures have all been made possible by the applications of science. Ten per cent. of their value—thirty million dollars a year—says Professor Cattell, might to advantage be spent in that city for the future advancement of science under the auspices of the University of Pittsburgh. At first thought, this proposition seems as startling to the "impractical" scientist as it does to the "hard-headed" business man. But why should this not be done?

In a letter from the Secretary of the Board of Water Supply of New York City, I am informed that the land owned by New York City about the Ashokan reservoir covers a total of 15,254 acres. Six thousand of these acres are forested with so-called second growth of white oak, rock oak, red maple, sugar maple, hemlock and white pine. The letter contains this significant sentence: "The chestnut growth is being removed on account of mortality from pests." There have been planted by the city on this watershed over 1,470,000 coniferous trees, more than 1,000,000 of which include six species of pine. The present value of these pine trees may be conservatively estimated at not less than $1,000,000 dollars, and the value increases from year to year—likewise their importance to the city's water supply. It is now common knowledge that some of these species of pine are being attacked by a fatal disease, the blister rust, recently imported into this country from Europe. Damage to the extent of hundreds of millions of dol-

lars is known to be caused every year in this country by imported plant and tree pests. Whose concern should it be to take every possible measure to learn the nature of the pine-tree blister rust which threatens property of New York City to the extent of several millions of dollars? Would it not be a perfectly reasonable business proposition to expend annually 10 per cent. of the value of the trees on the Ashokan watershed in order to ascertain effective means for the control or eradication of a tree disease which may necessitate a replanting of the entire area?

Several million dollars worth of potatoes are consumed in greater New York every year; who should be more interested than the residents of this city in supporting botanical research that has for its object the eradication of potato diseases in Maine, whence a large percentage of our supply is derived?

By the scientific and educational opportunities which it can afford our citizens, by diffusing in this community, and from this community as a center, a knowledge and love of plants, by botanical investigations in the realms of pure and applied science, the Brooklyn Botanic Garden can yearly render to the city of New York a service whose value will be far in excess of any sum of money that will ever be necessary for its annual maintenance.

At the opening of the Pasteur Institute, in Paris, in 1888, the founder of the science of bacteriology, near the close of his address, spoke as follows, smarting as he always did, at the memory of the events of the Franco-Prussian war:

> If science has no country, the scientist should have one, and ascribe to it the influence which his works may have in this world. If I might be allowed, Mr. President, to conclude by a philosophical remark inspired by your presence in this Home of Work, I should say that two contrary laws seem to be wrestling with each other nowadays; the one a law of blood and of death, ever imagining new means of destruction, and forcing nations to be constantly ready for the battlefield—the other, a law of peace, work and health, ever evolving new means of delivering man from the scourges which beset him.

These words seem written for the present occasion. Almost the entire civilized world is at war, but the ultimate triumph of freedom over tyranny, of civilization over vandalism, of right over wrong, may now be confidently predicted; peace, let us hope, is not far distant. In the realm of the intellect there is perpetual conflict of light over darkness, right over wrong, knowledge over ignorance and superstition. But the strongholds of ignorance and superstition, while perpetually yielding are eternally holding out. We shall never know it all, there will forever be ample opportunity for and need of scientific research—of the advancement and diffusion of knowledge. This is man's largest opportunity, the ultimate source of his greatest happiness.

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THE SCIENTIFIC WORK OF THE BUREAU OF FISHERIES

AFTER most careful consideration of its responsibilities in the present national exigency, the Bureau of Fisheries has determined upon the following principles and plans for its immediate guidance:

1. The service of science to fishery work is of such great possible significance that it would be a serious error to abandon the pursuit of proper scientific investigations.

2. The exigency of the national food situation is such that every practicable and proper effort should be made to bring about a greater production of fish and a better utilization of the available supply.

3. The conflict between the two principles just mentioned is more apparent than real, as may appear from the following statement of the bureau's plan.

4. The bureau will not interrupt important investigations which have been pursued for