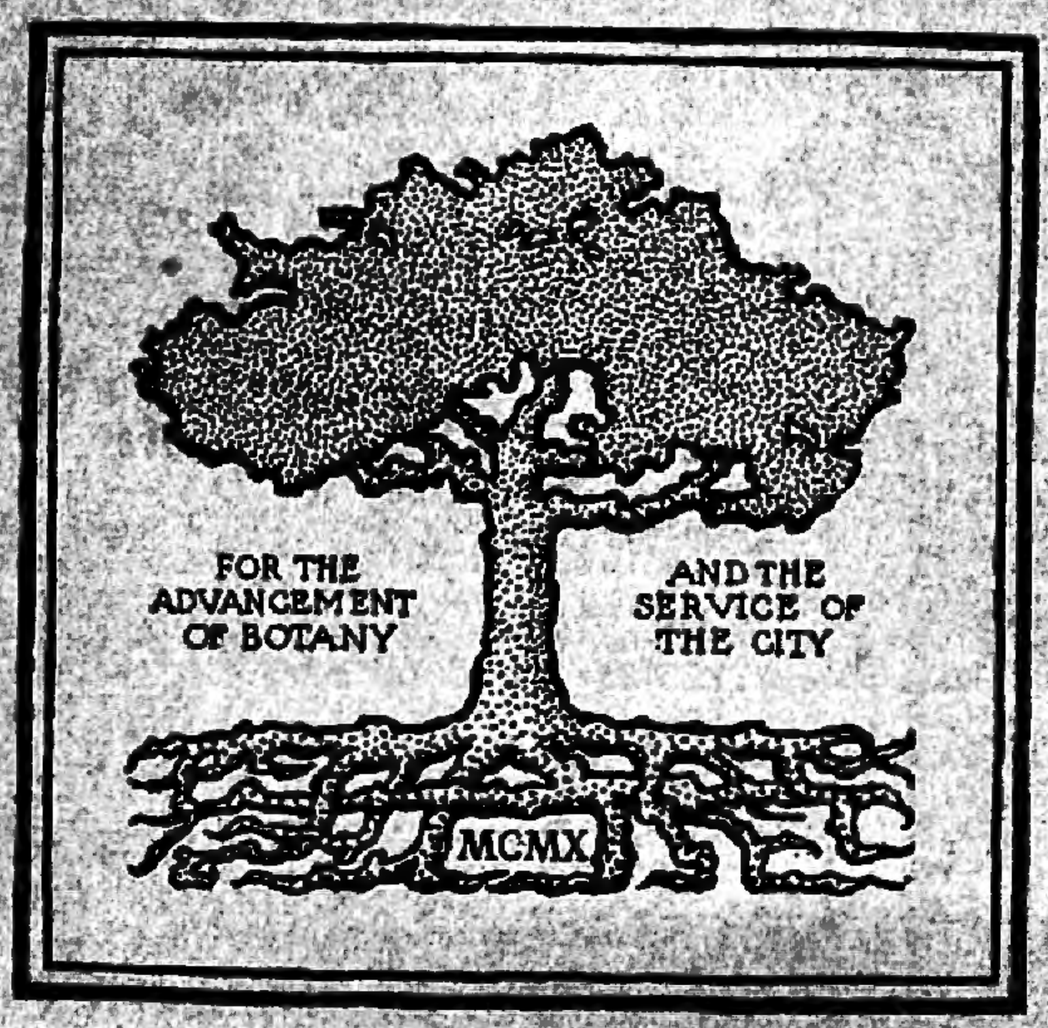
BROOKLYN BOTANIC GARDEN RECORD

VOL. IV JANUARY, 1915 No. 1

EDITED BY
C. STUART GAGER



CONTENTS

PUBLISHED QUARTERLY
AT 41 NORTH QUEEN STREET
LANCASTER, PA.

BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

Entered as second-class matter in the Post-office at Lancaster, Pa.,
under Act of August 24, 1912.

BOTANIC GARDEN STAFF

DR. C. STUART GAGER, *Director*

MR. NORMAN TAYLOR, *Curator of Plants*

DR. EDGAR W. OLIVE, *Curator of Public Instruction*

DR. O. E. WHITE, *Assistant Curator of Plant Breeding*

MISS ELLEN EDDY SHAW, *Assistant Curator of Public Instruction*

MISS BERTHA M. EVES, *Secretary*

DR. LAURA E. WATSON BENEDICT, *Librarian*

DR. WILLIAM MANSFIELD, *Honorary Curator of Economic Plants*

MR. HAROLD A. CAPARN, *Consulting Landscape Architect*

MR. MONTAGUE FREE, *Head Gardener*

MR. CULLEN ADLERBLUM, *Garden Aid*

MR. GUY R. BISBY, *Laboratory Assistant*

DR. ALFRED L. GUNDERSEN, *Herbarium Assistant*

MR. HERMAN KOLSH, *Foreman*

McKIM, MEAD & WHITE, *Architects*

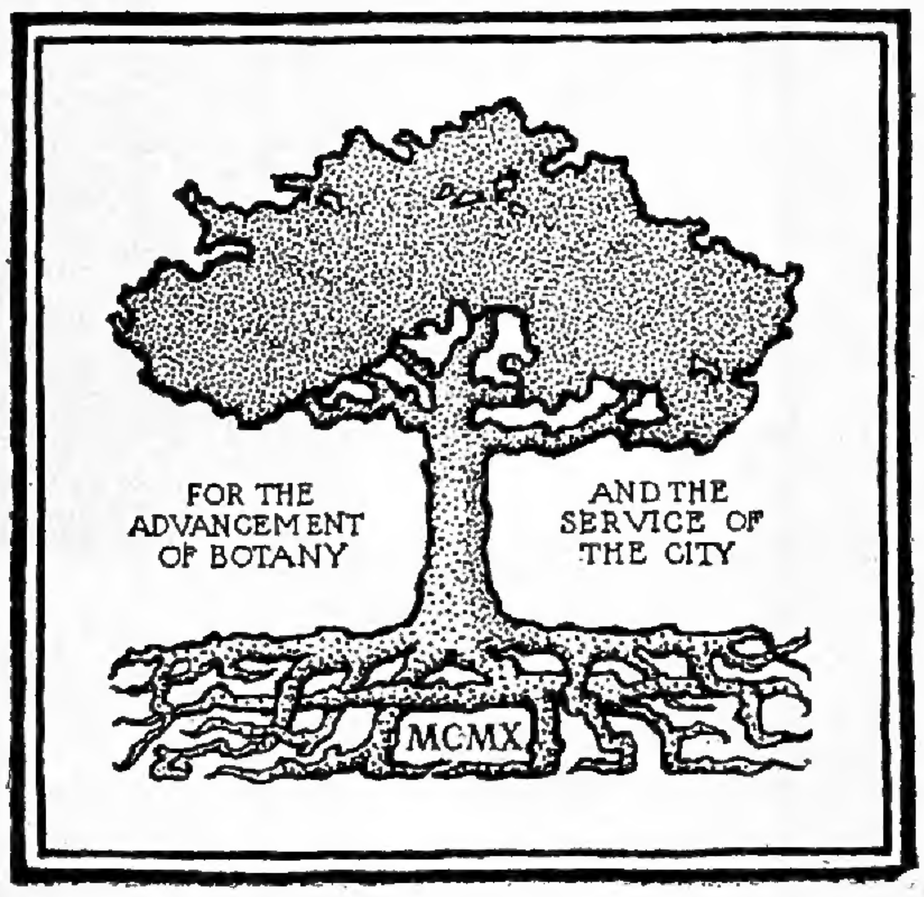
OLMSTED BROS., *Landscape Architects*

BROOKLYN BOTANIC GARDEN

RECORD

EDITED BY

C. STUART GAGER



VOLUME IV

1915

PUBLISHED QUARTERLY
AT 41 NORTH QUEEN STREET
LANCASTER, PA.

BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

PRESS OF
THE NEW ERA PRINTING COMPANY
LANCASTER, PA.

TABLE OF CONTENTS

ILLUSTRATIONS

Erratum

Page 24, line 10, for *Ushikubbo* read Ushikubo.

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN RECORD

VOL. IV January, 1915 No. 1

PROSPECTUS OF COURSES

OFFERED BY THE

BROOKLYN BOTANIC GARDEN, 1915

CHILDREN'S GARDENS AND NATURE STUDY

1. **Garden Practice.**—*A.* A course in outdoor work, open only to those pupils who are recommended by their teachers for excellence in nature study in their schools. The work includes the raising of common vegetables, flowers, and fiber plants. Open to both boys and girls. A fee of twenty cents will be charged, the material raised becoming the property of the pupil. 10 lessons every *Saturday* morning, 10:30–11:30, from *April 10–June 12.*

B. A summer's work in the garden, each child having his own plot. This is a continuation of Course 1*A*, and members of that course may enter also Course 1*B*. A fee of ten cents a month will be charged for material consumed. Each child has the product from his own garden. *Saturday* mornings, 9–11, *June 19–September 25.* Miss Shaw.

2. **Nature Study.**—The structure and germination of seeds; the parts of a plant and their uses; relation of the plant to soil, air, water, and light. The course consists of actual study of the plants themselves, with experiments and greenhouse work done by the children; no book work, no home work, no examinations. Open to children from 8–12 years of age. A fee of fifteen cents will be

charged to cover material used. A certificate will be given those who satisfactorily complete the course. Two courses will be given each spring and two each fall, as follows:

Boys' Spring Course.—*Saturday* mornings, 9–10, from *January 16–March 6.*

Girls' Spring Course.—*Saturday* mornings, 10:30–11:30, from *January 16–March 6.*

Boys' Fall Course.—*Saturday* mornings, 9–10, from *October 16–November 20.*

Girls' Fall Course.—*Saturday* mornings, 10:30–11:30, from *October 16–November 20.* Miss Shaw.

3. **Plant Propagation.**—Raising of plants from seed for the outdoor vegetable and flower garden; elementary study of soils. Work done in the children's greenhouse. Fee, for material used, ten cents. Girls and boys from 12 to 15 years of age are eligible to these courses. Two of these courses will be offered each spring, and two each fall, as follows:

Girls' Spring Course.—*Friday* afternoons, 3:30–4:30, *January 15–February 19.*

Boys' Spring Course.—*Saturdays,* 1:00–2:00, *January 16–February 20.*

Girls' Fall Course.—*Friday* afternoons, 3:30–4:30, *October 15–November 19.*

Boys' Fall Course.—*Saturdays,* 1:00–2:00, *October 16–November 20.* Miss Shaw.

4. **Greenhouse Work for Teachers.**—This course is planned to be of assistance to the teacher in garden work with children. A study of soils, and of the plant itself. Practical work in the propagation of plants, and the raising of flower and vegetable seedlings for the outdoor garden. A fee of 50 cents will be charged to cover cost of materials. *Thursday* afternoons from 4–5, *February 4–March 25.*

Miss Shaw.

Household Botany and Horticulture

5. **Garden Planning.**—Three lectures with practical demonstrations. The object of this course is to help owners of small places

to plan their yards and gardens to best advantage. *Wednesdays* at 4, *February 24–March 10.* Mr. Free.

6. **The Out-door Flower Garden.**—Ten lectures with demonstrations and practical work. Instruction will be given with regard to soils, preparation of ground for planting, propagation, hardy perennials, annuals, vines, herbaceous borders, summer bedding, shrubbery, roses, making and care of lawns, drainage, etc. A piece of ground has been set aside at the Botanic Garden for the purpose of being planned and planted by students in courses 5 and 6. *Wednesdays* at 4, *March 17–May 19.* Mr. Free.

7. **House Plants and Small Conservatories.**—Five lectures with demonstrations and practical work. The course includes consideration of principles to be observed in the care of indoor plants, and cultural details concerning suitable subjects. Instruction will be given with reference to hanging baskets, window boxes, Wardian cases, etc. A fee of $1.00 will be charged to cover cost of materials used. The plants raised by the class will become the property of those taking the course. *Wednesdays* at 4, *Jaunary 20–February 17.* Mr. Free.

8. **Garden and Greenhouse Work in Fall.**—A course of six lessons covering the making of cuttings, taking up and storing of plants, bulb planting, winter protection of plants, fall pruning, etc. *Thursday afternoons* from 4–5, *September 30–November 4.* A fee of $1.00 will be charged to cover cost of material used.
Mr. Free.

9. **Bacteria and Other Microorganisms in the Home.**—Eight periods devoted to lectures, laboratory work, and conferences on the occurrence of bacteria, yeasts, molds and other micro-organisms in the home; in water, sewage, etc. *Saturdays* at 11:00, *February 6–March 27.* Dr. Olive.

N. B.—Courses 5 to 9 inclusive are open free to the public unless otherwise specified. Those planning to take any of these courses are asked to register at the Garden at least a week before the course opens, so that adequate arrangement may be made for materials, etc. They are open to both men and women, *but will not be given in any case when less than six apply for them.*

Short Course in Popular Botany

10. **Local Flora.**—The elements of systematic botany, primarily for the purpose of getting acquainted with the native wild flowers. Field collecting, the making of a herbarium (for those who wish), lectures and conferences. Especially valuable for teachers of nature study. Eight *Saturday* mornings, at 9 o'clock, beginning *April 10.*

Course for Teachers of Children's Gardening

There is an increasing demand for persons adequately prepared to become teachers or supervisors of children's gardens, but opportunities to secure the necessary preparation are not numerous. As in other cases where special problems are to be met and solved, an interest in children, a mere liking for the work, or even native teaching ability, while highly essential, are not, of themselves, sufficient to insure success.

The following ten courses (11–20) are planned to acquaint the prospective teacher with some of the main problems to be met with in this work, and such effective solutions of them as have been worked out in practice. *The ten courses are considered as a unit, and are not offered separately.* Wherever possible it is urged that the entire course be completed within two school years. Special importance is attached to No. 20.

The fee for the entire course is Fifteen Dollars, which must be paid at the time of registration.

To those who satisfactorily complete the work a Certificate in Children's Gardening will be granted.

11. **Elementary Botany.**—A survey of general physiological and morphological principles, illustrated by a few of the more important types of plants. 16 lectures and demonstrations in laboratory and greenhouse. A high school course in botany, extending over at least one-half year, will be accepted in place of this course. *Wednesdays,* at 4 p. m., *February 10–May 26.*

Dr. Olive and Mr. Bisby.

12. **Nature Study.**—Nature in relation to gardens and plant life. Topics: plant structure; fruit and fruit formation; weeds;

weed dispersal; insect pests; birds in their relation to agriculture; garden friends; shrubs; shade and lawn trees. Credit will be given for this course in Nature Study on presentation of a satisfactory certificate of similar work done at any other accredited institution. 14 lectures. *Tuesdays,* 4–5 p. m., *February 16–April 20* and *October 5–October 26.* Miss Shaw.

13. **Soils and Agricultural Principles.**—A study of soils; fertilizers, natural and chemical; relation of water and air to soil; liming; mixing of soils and tillage. 5 lectures with laboratory work. *Tuesday* afternoons from 4–5, *January 12–February 9.* Miss Shaw.

14. **Plant Propagation and Greenhouse Work.** Methods of plant propagation, care of plants, cuttings, raising of seedlings for the outdoor garden. Work related to children's gardens. Laboratory work. 9 lessons. *Fridays,* from 3:30–5 p. m., *February 26–April 23.* Miss Shaw.

15. **Children's Garden Practice:** Practice work with a class of children; including such topics as planning and making the garden, laying out of grounds, preparation of soil, seed sowing, transplanting, cropping, cultivation, school garden management, improvement of school grounds, preparation of exhibits. 20 lectures and outdoor practice work. *Saturday* mornings, 10–11:30 from *February 6–June 19.* Miss Shaw.

16. **Fall Garden Work.**—Practical work with the outdoor bulb bed, harvesting of garden crops, indoor planting of bulbs, raising of plants indoors, the window box. 5 lessons on *Wednesday* afternoons from 4–5, *October 6–November 3.* Miss Shaw.

17. **Fungous and Insect Pests.**—3 lectures and demonstrations on the occurrence of, and methods of combating the commoner fungous and insect pests of garden and greenhouse plants. *Wednesdays* at 4 p. m., *September 15–September 29.* Dr. Olive.

18. **Pedagogy of Botany.**—A brief discussion of the mental processes involved in learning and teaching science, and the fundamental principles which underlie and point the way to laboratory and field work. 5 successive *Saturday* afternoons from 1:30–2:30, *October 23–November 20.* Dr. Gager.

19. **Genetics.**—Three lectures on the problems of heredity, variation, and environment, and their bearing on education; illustrated by demonstration material obtained from plant breeding experiments, and by lantern slides. *Saturdays* from 2:30–3:30, *November 6–November 20.* Dr. White.

20. **Practical Garden Work.**—A summer's work with children in a garden under supervision. This work may be done at the Brooklyn Botanic Garden, or its equivalent in some children's garden, the work of which is acceptable to the Botanic Garden.

Advanced Courses and Investigation

For the following advanced and research courses there is a charge covering all expenses, including laboratory fee, of $30 for a full course of 100 credit hours, and $20 for a half course of 50 credit hours.

Advanced Courses

21. **Mycology and Plant Pathology.**—Morphology and pathology of the fungi and bacteria. Life histories of fungi; methods of control of plant diseases, etc. Prerequisite, a satisfactory college course in general botany. 100 credit hours of work. Offered in the spring of 1915. Hours to be arranged.
Dr. Olive and Mr. Bisby.

22. **Fresh-Water Microbiology.**—A course of lectures, recitations, and laboratory work on the various organisms found in drinking water. Odors, colors, etc., of drinking water; methods of microscopical and bacteriological examination. 50 credit hours of work. Offered in the fall of 1915, beginning in September. Hours to be arranged. Dr. Olive and Mr. Bisby.

23. **Cytology.**—A course of lectures and laboratory work on cell physiology and cell morphology. Methods of cytological technique, and practice in accurate interpretation of cell phenomena. Prerequisite, satisfactory college courses in general botany and plant physiology. 100 credit hours of work. Offered in the fall of 1915, beginning in September. Hours to be arranged.
Dr. Olive and Mr. Bisby.

24. **Experimental Evolution.**—Detailed studies of the nature and causes of variation and heredity. Some of the subjects considered are: Historical Resumé of the Evolution Theory, Physical Basis of Inheritance, Inheritance of Acquired Characters, Kinds and Causes of Variation, Mendelism, Biometry, Principles and Technique of Plant Breeding. This course is open to students of college rank with a knowledge of the elements of physics, chemistry, geology, botany, and zoology. The work is primarily intended for students in pure science, and for agricultural or horticultural students fitting themselves for various professional activities in these particular fields. Three lectures and two laboratory periods a week. 100 credit hours of work. Hours to be arranged.

Dr. White.

25. **Phytogeography.**—A course dealing with plant distribution over the earth. Prerequisites are courses in plant ecology and geology, and a good general knowledge of climatology and systematic botany. 50 credit hours of work. Hours to be arranged.

Mr. Taylor.

26. **Seminar and Journal Club.**—A biweekly meeting of the Garden Staff and advanced students, for the discussion of fundamental problems of botany or of general biology, and for the review of pertinent botanical literature. Open to others on invitation.

Graduate Study and Botanical Research

27. **Research in Plant Physiology.**—Independent investigation of problems of plant metabolism and irritability. Thesis.

Dr. Gager.

28. **Research in Mycology and Plant Pathology.**—Independent investigation of problems in fungi and fungous diseases of plants.

Dr. Olive.

29. **Research in Plant Genetics.**—Independent investigation of problems of variation and heredity, including that phase of cytology having a direct bearing on the subject matter of genetics.

Dr. White.

Cooperation With Local Schools

A. **Talks at Schools.**—The principals of any schools, public or private, may arrange with the Director to have lantern talks given at the schools on various topics related to nature study, such as garden work with children, tree planting, and Arbor Day. If an illustrated lecture is desired, the lantern and operator must be provided by the school, but slides will be furnished by the Botanic Garden. Principals may address the Director for appointments.

B. **School Classes at the Garden.**—Schools not provided with lanterns may arrange for their classes, accompanied by their teachers, to come to the Botanic Garden. At present, not more than 70 children can be accommodated at any one time.

Notice of such a visit should be sent two days previous to the date on which a talk is desired. These talks will be illustrated by lantern slides, and by the conservatory collection of useful plants from the tropics and subtropics. The list of subjects, which are closely connected with geography and nature study, are as follows: Rice; Manila and sisal fibers (from which rope is made); Sugar; Cotton; Cork; Beverage plants (tea, coffee, cocoa, and chocolate); Wheat; Rubber; Local wild flowers; How to make, plant and cultivate children's gardens.

Demonstrations will be given to classes on such practical subjects as bulb culture; the making of cuttings; how to start seedlings; varieties, potting and care of house plants; how to lay out a small garden, with a lesson on planting the same.

The Garden equipment, including greenhouse, plant material, lecture room, lantern, and slides, is at the disposal of teachers who desire to instruct their own classes at the Garden. This must be arranged in advance with the Director, so that such work will not conflict with regular classes and lectures.

The principal of any secondary school in Brooklyn may arrange also for a series of ten lessons on plant culture to be given during the fall to a class. These lessons will be worked out for the most part in the greenhouse. Such a course must be arranged for in advance, and the class must be accompanied by its teacher.

C. **Home Gardening.**—Assistance will also be given to children in planning and planting home gardens. Enrollment cards

for such asistance may be had on application to the Brooklyn Botanic Garden. Prizes will be offered both to schools as well as to individuals, at the annual Children's Garden Exhibit, for the best results in home gardening. This exhibit is open to all children in the City of Brooklyn, although their garden products may have been raised at their summer homes. Certifications must be made that the work has been done by the child himself. The exhibit for 1915 will be held on the 24th and 25th of September. All exhibits, both those of schools as well as those of individuals, must be brought to the Brooklyn Botanic Garden on the afternoon of September the 23rd, or by 10 o'clock on the morning of the 24th. The exhibits will be judged on the afternoon of the 24th, and will then be on exhibition for the public from three to five o'clock on the afternoon of the 24th, and from ten in the morning until four in the afternoon of the 25th. After four o'clock of this day, exhibitors may remove their exhibits. Prizes will be distributed on Saturday afternoon, October 9, at three o'clock. Silver and bronze medals will be awarded as first and second prizes for individual exhibits. A bronze statue of Victory is the prize for the school making the best exhibit as a whole. This prize is to be competed for annually until one school wins it three times, when it will become the property of that school. A new prize will then be offered. This statue is now in the possession of P. S. 152, this school having won it last fall, at the first annual Children's Garden Exhibit.

D. **Penny Packets of Seeds.**—In order to assist the above work in every way possible, penny packets of seeds are put up by the Botanic Garden for the children's use. In the early spring, lists of these seeds, conditions for entry as an exhibitor, home gardening record cards, and other information may be had on application to the Garden.

E. **Conferences.**—Conferences may be arranged by teachers and principals for the discussion of problems in connection with gardening and nature study. Monday and Saturday afternoons are usually available for this purpose. Appointments must be made in advance. Address Miss Shaw.

F. **Study and Loan Material.**—On request, the Garden will endeavor to provide living seedlings or plant parts for study, to the extent of our present limited facilities. Teachers may arrange to have various physiological experiments or demonstrations conducted at the Garden. Petri dishes, ready for exposure, will also be loaned on request of teachers. Schools must arrange to call for study or loan material, and must return the loan material promptly in good condition.

Docentry

Classes, and other parties of several persons, wishing to view the plantations under guidance, may arrange with the Curator of Public Instruction for appointments with a docent to conduct them through the Garden. For this service there is a charge of 25 cents an hour or fraction thereof, or 10 cents a person for parties of three or more; except that no charge is made for teachers with classes.

The Herbarium

The Garden herbarium consists at present of over 100,000 specimens, including phanerogams, ferns, mosses, liverworts, lichens, parasitic and other fungi, algæ, and myxomycetes. This collection may be consulted by those interested, and specimens submitted will be gladly identified. Address the Curator of Plants.

The Library

The rapidly growing library of the Garden occupies temporary quarters on the main floor of the laboratory building. This is not a circulating library, but is open free for consultation to all persons, from 9 a. m. until 5 p. m. Over 60 current periodicals devoted to botany and related subjects are regularly received.

Lectures for Children

(Admission only by Ticket)

Stories About Useful Plants. (Illustrated.)

April 10. *Rope and how it is made.*

April 17. *Cork and the uses we make of it.*

April 24. *How to make a garden.*
May 1. *Rice, the food of a billion people.*
May 8. *The wild flowers now in bloom.*

It is necessary to limit the number of tickets for these talks to children. This is due to the small size of the present lecture room. Not more than 70 children can be accommodated at any one talk. Tickets will be issued in the order of application until the number is exhausted.

These talks will be repeated for school classes, if so desired, either at the Garden or at the school.

A BOYS' AND GIRLS' INDUSTRIAL EXPOSITION

The boys and girls of the state of Vermont held, during the last week in October, at Windsor, an Industrial Exposition. This fact is significant of advance in children's work. Exhibits came from all over that state, even from the smallest rural community. It was an opportunity for the boys and girls of an entire state to show at one time and at one place the work they had been doing with their own hands.

This exposition is a part of a widespread campaign, but in no other state has there ever been so complete and typical an exhibit. It was typical in that it expressed in many ways the everyday efforts of the schools, State University, and other institutions of Vermont for the real education of children. One placard in the Arena, where the exhibit was held, was expressive of our modern viewpoint: "Boys do not leave the farm because of hard work, but because there is nothing there but hard work." The exposition represented hard work on the part of farm boys and girls, but hard work with an outlook.

Any boy or girl under eighteen might exhibit. These exhibits ranged from cocks, prize pumpkins, and potatoes, to models of flying machines, and fine darning of socks. Some of the best work was done by the students from the Lyndon School of Agriculture. This exhibit was in charge of a student, a lad of seventeen. In fact, all the exhibits were in charge of boys and girls, and much of the judging was done by them under supervision. The band

was composed of boys from a State reformatory; and a good band it was, too.

Another exhibit of merit was that by the Lyndon Home Garden Class. In 1908 one of the ladies of Lyndon felt that something ought to be done for the boys and girls, to interest them vitally in their own home gardens. So out of her own time and money she organized a Home Garden Class. The work centered around the garden. Two little children in this class, distant from schools, living on a mountain, exhibited beet sugar extracted from their own sugar beets. Among the vegetables exhibited were some models of hot beds for children's use, designed by one of the boys. This exposition stood for the work of eleven rural schools and 280 pupils.

Boys and girls were everywhere explaining, guiding, and apparently managing the Exposition. Back of the children were the State University, at Burlington, the Y. M. C. A., and local committees of adults. Many states are working thus with their rural communities, but in no other state has the work been so well organized in regard to the boys and girls themselves.

Each day two hours were set aside for speaking and demonstrations in cookery. The afternoon program of the last day was as follows:

2 p. m. Address, "Industrial Education in the United States." J. L. McBrien, Bureau of Education, Washington D. C.

Address, "Incidents from my Experiences with Boys and Girls." Miss Ellen Eddy Shaw, Brooklyn Botanic Garden, Brooklyn, N. Y.

4 p. m. Demonstrations in Cooking.

Ellen Eddy Shaw.

THE AFRICAN BOW-STRING HEMP

During the last week in June and the first week of July an interesting fiber plant (*Sansevieria guineensis*) was blooming in the economic house of the conservatory range. The flowering of this tropical African plant under cultivation is sufficiently rare to

FIG. 1. African bow-string hemp (*Sansevieria guineensis*) in bloom in the Economic House of the conservatories, June–July, 1914.

warrant a brief note. The specimen was secured from the New York Botanical Garden in the autumn of 1913.

The genus *Sansevieria* comprises 12 to 14 species, related to the red-root (*Gyrotheca tinctoria*) of our New Jersey pine-barrens, if the view of Mr. J. G. Baker that the bow-string hemps belong to the bloodwort family (Haemodoraceae) be accepted. Other writers have often included them in the lily family. They are herbs with clusters of thick, flat, or cylindrical leaves from a creeping rootstock. They bear at the end of a stout, basal stalk, a long spike, usually many flowered. The perianth is corolla-like, usually greenish-white, and consists of a narrow cylindric tube and six linear lobes. The fruit is membranous and its rather early bursting releases from one to three nearly round seeds. The Garden specimen, unfortunately, did not bear any fruit, and therefore produced no seeds.

Of chief interest from the economic standpoint is the fiber that is found in the body of the leaf. In the species flowering at the Garden, an illustration of which is presented herewith (fig. 1), the leaves are from 2 to 3½ feet long, and about 2 inches broad. The fiber is extracted by the natives of tropical Africa for bow-strings, as it is fine, silky and of considerable elasticity. A related species (*S. zeylanica*), from India, products a fine fiber that is extensively employed in making cordage for deep-sea dredging. The fiber is extracted by retting, in water.

The African bow-string hemp has been long in cultivation, having been grown at Hampton Court Gardens as early as 1690. Its curious variegated white and green leaves, and the large spike of whitish flowers make it an attractive plant for any greenhouse collection. It is readily propagated by division, or by leaf cuttings which root in sandy soil within about four weeks. The new plant is produced at some distance from the cutting by a long bud resembling a stolon or "runner." The plant thrives in heavy soil, and diffused sunlight.

NORMAN TAYLOR.

NOTES

On the afternoon of October 22, 1914, members of the Board of Trustees of the Brooklyn Institute of Arts and Sciences met at the Garden, as the guests of the committee on Botanic Garden, for the purpose of inspecting the work done during the summer on the contracts for grading, soil-improvement, and construction of new paths, and the Japanese garden then nearing completion. After the tour of inspection tea was served in the library by the ladies of the Garden staff. In the library numerous specimens were on exhibit illustrating experiments in plant breeding carried on during the season just closed.

On November 21, 1914, formal exercises were held in the laboratory building in recognition of the completion of the first course of study for the preparation of teachers of children's gardening. The course began last January, and was completed on November 14. The address was given by Dr. Gustav Straubenmüller, associate superintendent of schools of New York City, on the Educational Value of Children's Gardens. Certificates in Children's Gardening were awarded to the seven young women who had completed the course. After the awarding of certificates, tea was served by the department of public instruction of the Garden. At the table were Miss Anna B. Gallup, curator of the Children's Museum, of Brooklyn, and Miss Grace Strachan, district superintendent of schools.

The committee on the examination in botany, of the Association of Colleges and Secondary Schools of the Middle States and Maryland, held their meeting at the Garden on the afternoon of November 27. This committee is composed of Prof. W. W. Rowlee, Cornell University, chairman, Dr. Margaret C. Ferguson, Wellesley College, and Mr. George C. Wood, Boy's High School, Brooklyn.

During November the trustees of the Long Island Historical Society voted to deposit with the Garden their herbarium of between 3000 and 4000 specimens, and comprising a large number of species from Long Island. This very courteous and greatly

appreciated action was taken in recognition of the fact that the Garden is now the botanical center of Brooklyn, and that all botanical collections will be of greatest usefulness to the largest number of citizens if deposited at the Garden. The collection was received on November 20.

Among recent additions to the library is a complete set of the Gardener's Chronicle, consisting of 104 bound volumes, from 1844 to 1913. This set is nearly perfect, the thirteen missing parts and figures being fortunately of very little importance.

The fall planting in the systematic section included about one thousand shrubs. Two shipments of plants expected, one from France, the other from Australia, were not shipped on account of the abnormal conditions caused by the European war.

On Saturday, September 24, 1914, the New York Section of the National Nature Study Association met at the Ethical Culture School, Manhattan. Mrs. Anna Botsford Comstock, national president, spoke on Nature Study. Miss Ellen Eddy Shaw, of the Garden staff, was elected president of the Section for the ensuing year.

On December 11, the Associated High School Biology Clubs of New York City held their first meeting at the Laboratory building of the Garden. At the close of the business session an address was delivered by the Director of the Garden. The biology clubs of the City high schools are voluntary organizations, composed of students who have done meritorious work in biology. The federation of the clubs was accomplished during the fall of 1914, with Mr. Walter Measday, of Erasmus Hall High School, as president.

The Brooklyn Institute of Arts and Sciences

Officers of the Board of Trustees

President—A. AUGUSTUS HEALY
First Vice-President—HON. CHARLES A. SCHIEREN
Second Vice-President—COL. ROBERT B. WOODWARD
Third Vice-President—GEORGE D. PRATT
Treasurer—DANIEL V. B. HEGEMAN
Secretary—HERMAN STUTZER

Executive Committee

A. AUGUSTUS HEALY

E. Le GRAND BEERS — GATES D. FAHNESTOCK
DR. GEORGE W. BRUSH — DANIEL V. B. HEGEMAN
HON. WILLIAM J. COOMBS — DICK S. RAMSAY
GEORGE D. PRATT — HERMAN STUTZER
WALTER H. CRITTENDEN — ALFRED T. WHITE
COL. ROBERT B. WOODWARD

Committee on Botanic Garden

ALFRED T. WHITE

GATES D. FAHNESTOCK — GEORGE D. PRATT
ALBERT DeSILVER — WILLIAM A. PUTNAM

Ex Officio Members of the Board

THE MAYOR OF THE CITY OF NEW YORK
THE PRESIDENT OF THE BOROUGH OF BROOKLYN
THE COMMISSIONER OF PARKS, BOROUGH OF BROOKLYN

PUBLICATIONS

OF THE

BROOKLYN BOTANIC GARDEN

RECORD. Established January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the annual report of the director and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Department of Botany of the Institute. To others one dollar a year; 25 cents a copy.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

1. *The educational work of botanic gardens.* 13 pages. 1911.

2. *The purpose of an introductory course in botany.* 8 pages. 1911.

3. *Cryptomeric inheritance in Onagra.* 11 pages, figs. 2; plates 2. 1911.

4. *On the origin and present distribution of the pine-barrens of New Jersey.* 15 pages, figs. 2. 1912.

5. *Ingrowing sprouts of Solanum tuberosum.* 10 pages, figs. 6; plate 1. 1912.

6. *Intermingling of perennial sporophytic and gametophytic generations in Puccinia, P. obtegens and Uromyces Glycyrrhizae.* 15 pages, 1 plate. 1913.

7. *Studies of teratological phenomena in their relation to evolution and the problems of heredity. 1. A study of certain floral abnormalities in Nicotiana, etc.* 14 pages, figs. 4. 1914.

8. *Some observations on the formation of the capillitium and the development of Physarella mirabilis Peck and Stemonitis fusca Roth.* 15 pages, 2 plates. 1914.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

1. *The Brooklyn Botanic Garden.* Price, 5 cents.

LEAFLETS. Established April 10, 1913, and published weekly or biweekly during April, May, June, September, and October. The purpose of the Leaflets is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Current numbers free to all who wish them. Back series complete, 50 cts. each; back numbers, 5 cts. each.

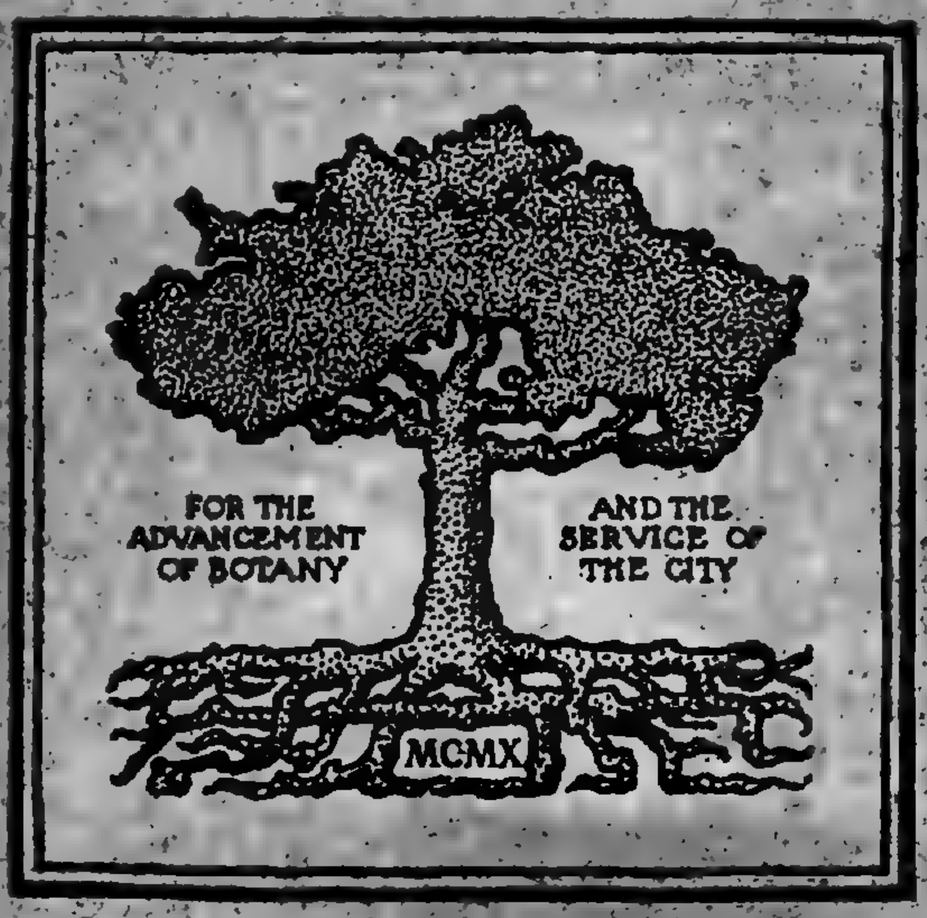
SEED LIST. Issued in December of each year.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in cooperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription rates: to members of the Botanical Society of America, $3.00 a year; to all others $4.00 a year.

BROOKLYN BOTANIC GARDEN RECORD

VOL. IV APRIL, 1915 No. 2

EDITED BY
C. STUART GAGER



CONTENTS

PUBLISHED QUARTERLY
AT 41 NORTH QUEEN STREET
LANCASTER, PA.

BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES.

Entered as second-class matter in the Post-office at Lancaster, Pa.,
under Act of August 24, 1912

BOTANIC GARDEN STAFF

DR. C. STUART GAGER, *Director*

MR. NORMAN TAYLOR, *Curator of Plants*

DR. EDGAR W. OLIVE, *Curator of Public Instruction*

DR. O. E. WHITE, *Assistant Curator of Plant Breeding*

MISS ELLEN EDDY SHAW, *Assistant Curator of Public Instruction*

MISS BERTHA M. EVES, *Secretary*

DR. LAURA E. WATSON BENEDICT, *Librarian*

DR. WILLIAM MANSFIELD, *Honorary Curator of Economic Plants*

MR. HAROLD A. CAPARN, *Consulting Landscape Architect*

MR. MONTAGUE FREE, *Head Gardener*

_____, *Garden Aid*

MR. GUY R. BISBY, *Laboratory Assistant*

DR. ALFRED L. GUNDERSEN, *Herbarium Assistant*

MR. HERMAN KOLSH, *Foreman*

McKIM, MEAD & WHITE, *Architects*

OLMSTED BROS., *Landscape Architects*

FIG. 2. Japanese garden. Preliminary sketch by Mr. T. Shiota, landscape architect.

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN

RECORD

VOL. IV April, 1915 No. 2

FOURTH ANNUAL REPORT OF THE BROOKLYN BOTANIC GARDEN, 1914

REPORT OF THE DIRECTOR

To the Committee on Botanic Garden.

Gentlemen: I have the honor to submit herewith the fourth annual report of the Brooklyn Botanic Garden, of the Brooklyn Institute of Arts and Sciences, for the year ending December 31, 1914.

Laboratory Building

Request for Appropriation for Additional Sections Pending.— The situation with reference to our buildings, unfortunately, remains substantially the same as indicated in my preceding annual report. A request for an appropriation sufficient, at least, to make possible the erection of the central section of the laboratory building, and the section connecting that with the one now occupied, has been before the Board of Estimate and Apportionment of the City since January 23, 1914. This request was transmitted by the late director of the Institute, Professor Hooper.

The original request of January 23, 1914, was for an appropriation of $128,500, the estimated cost of constructing the two new sections above indicated, and of completing the range of plant houses. The items which make up this total are as follows:

ESTIMATE OF COST OF ADDITIONAL BUILDING NOW URGENTLY NEEDED

Central section of Laboratory Building and the section connecting it with the wing already constructed	$ 69,500
Southeast Plant House	26,000*
Southwest Plant House	18,000*
Northwest Plant House	15,000
Total	$128,500

Subsequently to making this request the items for the completion of the plant houses were withdrawn, leaving only the first item, amounting to $69,500, and in view of the fact that there remains of the original appropriation of $100,000 an unexpended balance of $5,789.31, the amount of the additional appropriation requested has been reduced to $65,000. Up to December 31 no final action had been taken on this request by the Board of Estimate and Apportionment.

Extension of Chimney.—The stack of the heating plant was originally planned to be 79 feet high from the floor of the boiler room, or 59 ft. 6 in. from the roof of the boiler room. On account of the unsightly appearance of so tall a stack, located so prominently and near the laboratory building, the suggestion was made to reduce its height to about 50 feet above the ground (or roof of the underground boiler room). By an error in the revised plans the height was reduced to 50 ft. from the floor of the boiler room, and this brought the top of the stack below the roof of the main building. As no funds were available from the city to correct this error, and as the correction was absolutely necessary, the financial responsibility was assumed by the chairman of the committee on botanic garden. The order was transmitted by the architects, McKim, Mead & White, on December 12, 1913, to the M. W. Kellog Co., 50 Church St., New York City, to raise the stack by 20 ft., at a cost of $453 for all necessary labor and materials. The dimensions involved are given in the following table.

HEIGHTS OF CHIMNEY FROM BOILER ROOM

Height of stack as planned, from boiler room floor	79 ft.
Height of stack as planned, from boiler room roof	59 ft. 6 in.
Height of stack as built, from boiler room floor	50 ft.

* This includes the service basement under these two houses.

Height of stack as built, from boiler room roof ..... 30 ft. 6 in.
Height of stack as raised, from boiler room floor ..... 69 ft. 8 in.
Height of stack as raised, from boiler room roof ..... 50 ft. 2 in.

This work was completed on January 21, 1914.

Plant Houses

Economic House.—The construction of the cement water tank, the stone bridge and steps, and the valley and stream in the larger, central house, in accordance with designs prepared by the Pierson U-Bar Company, and approved by the Committee on Botanic Garden, were completed during the first week in May. The house has hitherto been commonly called the "Palm House," but in harmony with the plan to devote it to an exhibit of useful plants of the tropics, it will hereafter be designated as the "economic house."

Defects in Original Construction Corrected.—Up to December, 1914, the plant houses had never been put into entirely satisfactory condition by the contractors. The floor of house No. 1, which is over the potting room, was never water-tight, as specified, with the result that the potting room was never comfortable; for a part of the past year it has not been possible to use it at all on account of the leakage of water from above. The matter has finally been satisfactorily remedied under the supervision of the architects.

The economic house apparently sagged continually after it was built, and the stresses and strains resulting have caused a very considerable breakage of glass. Careful inspection by the architects and contractors disclosed the fact that the superstructure had settled at least four inches since it was finished. This defect has now been remedied, and the structure strengthened by four upright supports of steel tubes. Fortunately these supports do not appreciably detract from the good appearance of the interior.

Grounds

New Addition.—On August 17, 1914, an agreement* was entered into between the City of New York and the Brooklyn Institute of Arts and Sciences, amending the agreement of September 9, 1912, which amended that of December 28, 1909, and

* See Appendix 8.

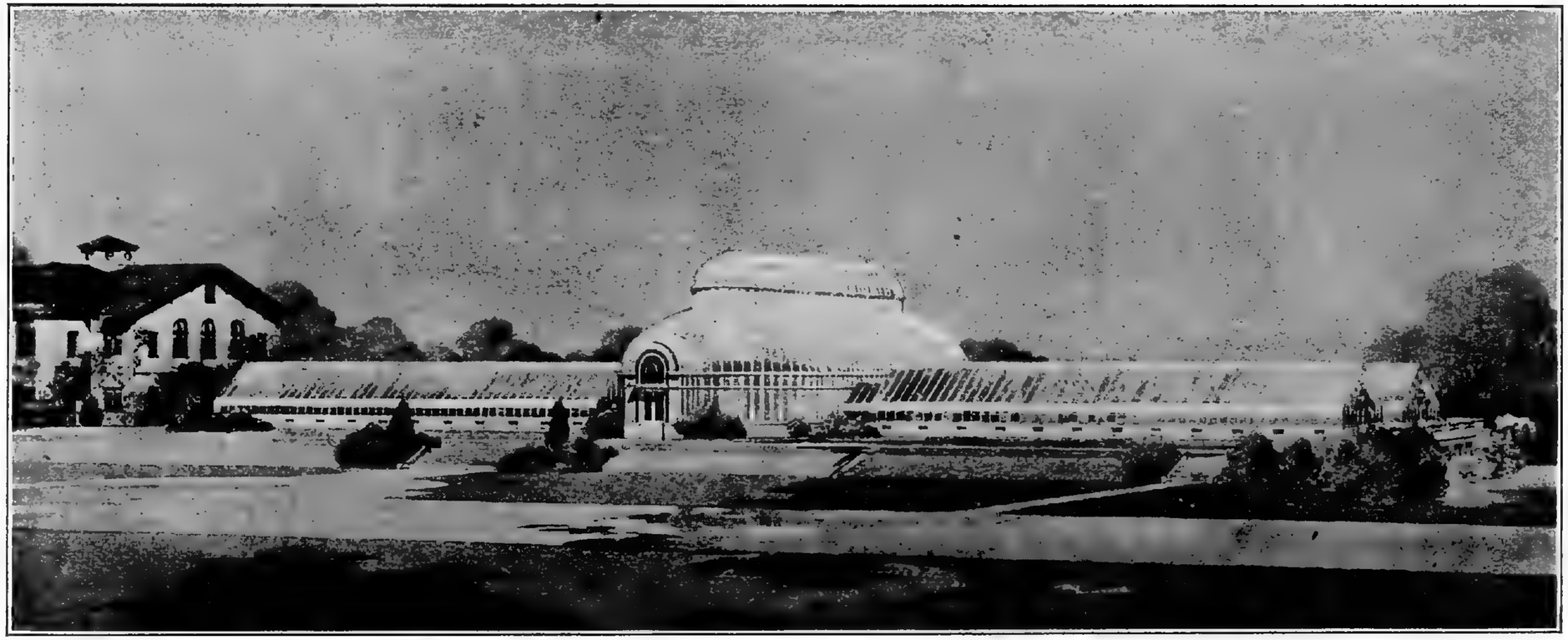


FIG. 3. Conservatories, as planned, and south pavillion of the Laboratory Building. Looking east.

leasing to the Institute for addition to the Botanic Garden, a parcel of about eight acres of land lying opposite the Willinck Entrance to Prospect Park, between Washington and Flatbush Avenues. This area has, for a number of years past, served as a place for the burning of rubbish from the Park, and for the temporary storage of gravel, sand and topsoil. Situated as it is, near the center of population of the Borough, and at the intersection of five important lines of rapid transit, it has long been an eye-sore to the thousands of persons who pass it daily. It will now be developed and beautified as an integral part of the Garden, in accordance with plans already adopted.

The fence separating this newly acquired parcel on the north from the original area of the Garden, stands on the boundary line between the former city of Brooklyn and the township of Flatbush. In the development of the new land, it would be of considerable historical interest to have the location of this boundary indicated in some suitable, permanent manner.

New Walks.—During the early spring, bids were advertised for, for the continuation of grading and the construction of new walks, as planned by Olmsted Brothers, landscape architects. The type of construction is that commonly designated as "penetration asphalt." The successful bidders for the work of constructing the walks, Messrs. Di Menna & De Paola, of 2336 Cambrelling Ave., Bronx, were notified by the Commissioner of Parks to begin work on their contract on or before May 3, 1914. The work actually began on Wednesday, May 6. The specifications called for its completion in ninety consecutive working days, and an extension of thirty working days was allowed by the Board of Park Commissioners, giving a total of 120 working days allowed. The work was not finished until October 31, 1914, one hundred and nine (109) working days from its beginning. This contract included nearly all of the walks at present contemplated on the original area of the Garden, the walk leading to the proposed entrance on Eastern Parkway, and the new approach to the southeast gate of Mt. Prospect reservoir property.

As only two thirds of the 15 per cent. commission of the landscape architects for this contract was provided by the City, the remaining 5 per cent. (amounting to $497.97) was assumed by

the Committee on Botanic Garden, to be paid from endowment income in 1915, together with an item of $99.13 for additional engineering assistance and incidentals.

Grading Operations.—The second contract for grading included the remaining work of grading the esplanade leading to the Museum building, and the removal of the remaining part of the embankment adjacent to the Museum building on the west, on the land acquired in 1913 from the Department of Water Supply, Gas, and Electricity. The contract was awarded on May 21, 1914, to Messrs. Norton & Gorman, the lowest bidders. The work began on June 25, and was specified to be completed in 45 consecutive working days. An allowance of 15 extra days, made by the Board of Park Commissioners, extended the total time allowed to 60 working days. The work was finished on September 12, 1914, in 52 consecutive working days.

This work left an area of about eight acres, largely devoid of top soil, and all to be top graded and made into lawn—if possible, during 1915.

Expenditure of Private Funds for Grading.—Partly on account of a change in the plans for the esplanade, and partly because of the poor work of the contractor in 1913, a large amount of extra grading was necessitated. For this there was no provision in the City appropriation, and so it was done by our own men, under the supervision of the Garden foreman, during the month from June 8 to July 6, 1914. The expense involved, amounting to $1,262.07, was met from private funds provided by two of the Institute trustees.

In addition to the grading done in connection with the above contract, considerable top-grading and other work has been done by our own laboring force on the area roughly regraded in 1913. Fuller details of this work are given in the appended report of the curator of plants.

Out-of-Doors Work Resumed.—Spring work out of doors was resumed on March 17, the same date as in 1913, and was brought to a close on November 14, one week earlier than the preceding year. This was necessitated by lack of funds, though plenty of work remained to be done.

Inspection by the Trustees.—The trustees of the Institute were

invited by the committee on botanic garden to inspect the buildings and grounds on October 22. At the close of the inspection tea was served in the temporary library room by the ladies of the Garden staff.

FIG. 4. Japanese garden. General view from east shore of lake. October, 1914.

Japanese Garden

The circumstances that finally led to the construction of a Japanese garden on the northwest slope of the lake were given in the RECORD for October, 1914. As there stated, the construction of this garden was made possible by the generosity of the chairman of the committee on botanic garden. The work has been done by four Japanese carpenters and a number of Italian laborers under the supervision of Mr. T. Shiota, a Japanese landscape architect recommended by the Japanese Consul-General at New York.

Without question, this garden will be the most striking feature, and one of the most beautiful, in the Botanic Garden, and will undoubtedly be the most unusual artificial landscape design within the limits of Greater New York. It has been pronounced by competent Japanese critics as the most perfect Japanese garden in the United States, and, with possibly one exception, the only one open free to the public daily. The area covered by the garden is about one quarter of an acre. The following quotation is from a letter of December 7, 1914, to the director, from Mr. D. J. R. Ushikubbo:

"Relative to the Japanese garden, I take the liberty of expressing my opinion from the standpoint of the Japanese idea; that is, that it is certainly the most beautiful and finest garden I have ever seen, among many examples now under construction in America. Although it is not very large in area, it looks complete, and makes everyone feel as if he were in Japan.

"The tea house and *tsukimido* (moon view house) are truly representative of the art of Japanese gardening."

Proposed Rock Garden

In the entire city of Greater New York there is no public rock garden, such, for example, as is common in England. Our extensive grading operations during the past two years have uncovered a large quantity of glacial drift boulders of all sizes, and while this is not the material one would choose, above all others, for a rock garden, nevertheless it can be utilized to advantage. A large number of these boulders have been deposited at the site of the proposed rock garden, at the edge of the ecological section, the garden has been carefully planned, and the only thing necessary to make possible its completion during 1915 is a gift of from $2,500 to $3,000 by some generous and public-spirited lover of art and nature.

Plantations

Work Done.—The work done in the development of the plantations during 1914 is noted in detail in the appended report of the curator of plants. Perhaps the most important is the beginning of installing the General Systematic Section. The plan for this section provides for grouping the beds by orders, and

surrounding each ordinal group by the botanically related shrubs. The year's planting included about 900 shrubs.

FIG. 5. Japanese garden. Construction of resonating caves for waterfalls. August 18, 1914.

Number of Plants under Cultivation.—The total number of plants now under cultivation in our scientific collections (not counting purely ornamental planting) includes 4,068 species, representing 1,029 genera. This is an increase over last year of 963 species and 225 genera.

Seed Collection for Exchange.—During the season seeds have been collected, both from our cultivated plants and from those growing wild in the vicinity of the Garden, for exchange with other botanic gardens and scientific institutions. Our first *Seed List* was issued in December, 1914. This work has been under the supervision of the head gardener, and will be a means, not

only of enriching our own collections, but of enabling the Garden to return, in some measure, the numerous courtesies it has received from other similar institutions.

Library

Growth.—A statistical report on the library, appended hereto, gives the total number of volumes on December 31, 1914, as 3,033, and in addition about 3,650 pamphlets. There was an increase over 1913 of 1,403 volumes and 1,652 pamphlets. The largest single additions were the library of Mr. E. L. Morris, and the valuable gift of the botanical library of Mrs. Annie Morrill Smith, comprising 792 volumes and 508 pamphlets. The latter library is specially rich in works on Bryophytes (Liverworts and Mosses), and constitutes the most valuable single addition to our library since the Garden was founded.

Cooperation with the Brooklyn Public Library.—In my Annual Report for 1913 I took pleasure in recording the deposit with our library by the Trustees of the Brooklyn Public Library, of a complete set of *Curtis's Botanical Magazine.* On May 4, 1914, the suggestion was made to the authorities of that institution to deposit with the Garden Library their complete set of the *Annals of Botany,* the *Botanical Gazette,* volumes 1–17 and 39–50, and *Edwards' Botanical Register,* volumes 1–10, on the ground that the large majority of persons in Brooklyn who are interested in botany would be served more efficiently by having such sets at the Garden than at any other library in the Borough, since the Garden is fast becoming the botanical center of Brooklyn. On May 23 we were notified of the action of the book committee of that library, voting that the set of the *Annals of Botany* be deposited with the Garden, with the understanding that it may be recalled at any time, but that the *Botanical Register* and *Botanical Gazette* were needed in the reference department at the Montague Branch. The importance of the *Annals,* and the difficulty of securing complete sets make this generous action of the trustees of the Brooklyn Public Library especially appreciated. The current numbers are also sent to the Garden as received, and the new volumes, bound by the Garden as soon as completed, remain the property of the Brooklyn Public Library.

Temporary Quarters Outgrown.—The library now has about twice as many volumes as can be accommodated on its shelves. The over volumes are packed in boxes where they are practically inaccessible. The present temporary quarters can accommodate with difficulty about as many more stacks as we already have, but when these are in place all possibilities for more shelving will have been exhausted until the construction of the next two sections of our building. This condition we face with the needs of our staff and the number of readers constantly and rapidly increasing.

Herbarium

Growth.—The appended report of the curator of plants shows that the phanerogamic herbarium has increased during the year by over 18,000 specimens.

Collections acquired.—At the suggestion of the director of the Garden, the chairman of the committee on botanic garden, on October 26, addressed a letter to the chairman of the executive committee of the Long Island Historical Society suggesting that the herbarium specimens owned by the Society, but not readily accessible for public consultation, be transferred to the Brooklyn Botanic Garden, either in exchange for books, or as a loan, so that the specimens might be more conveniently accessible, not only to the Garden staff, but also to the general public. The executive committee of the Society took action on this proposal as indicated in the following letter:

Nov. 5, 1914.

Alfred T. White, Esq.,
40 Remsen Street.

My dear Mr. White:—

At a meeting of the Executive Committee of the Long Island Historical Society, held Tuesday afternoon, it was the unanimous opinion of the Committee, that the greatest possible use of our herbarium ought to be made but that it was unwise to treat it other than as a whole.

It was the opinion of the Committee that if you would take the entire collection, stamping the name of the Society on each sheet so that the ownership of it might be evident, that the whole of it should be loaned to the Brooklyn Botanic Garden, to make such use of it as might seem wise to them.

Trusting that this may meet with your approval and that such action of the Executive Committee can be approved at the meeting on Monday evening next, I am

Very truly yours,
(Signed) Wm. B. Davenport,
Chairman.

The conditions named in the above letter were agreed to, and the collection was received at the Garden on November 20, 1914.

Special mention should also be made of the purchase of the herbarium of the late E. L. Morris, formerly curator of natural science in the Brooklyn Institute Museum. This collection consists of over 9,000 specimens, and is specially rich in the genus *Plantago,* on which Mr. Morris had specialized for some years.

Crowded Quarters.—The statement of the curator of plants (p. 50) concerning the inadequacy of the present temporary quarters of the herbarium, is worthy of special note. Even after doubling our present number of metal cases, we shall have room for less than half the collection. The erection of new metal cases will necessitate placing the wooden cases in our small public corridor. Here, as in the case of the library, relief can come only by the construction of the next two sections of the building.

The Staff

New Head Gardener.—On January 22, 1914, Mr. John V. Borin, head gardener since April 1, 1911, sent in his resignation to take effect on March 1. The appointment of his successor, Mr. Montague Free, was recorded in the Record for July, 1914.

Librarian.—On April 24, 1914, Miss Helen Virginia Stelle, librarian since September 1, 1913, resigned. On June 1, 1914, Miss Anna K. Fossler, formerly supervisor of the serial department of the library of Columbia University, was appointed acting librarian, which position she held until July 8. The Garden was without a librarian for the remainder of the year, but the appointment of Dr. Laura E. W. Benedict will take effect on January 1, 1915. Dr. Benedict's academic and professional experience is as follows:

1890–96, Newberry Library, Chicago. Accession and cataloging departments.

1896–99, Lewis Institute Library, Chicago. Organizer and librarian.
1900–02, Lewis Institute, Librarian and instructor in library economy.
1900, Received the degree of A.B. from the University of Chicago.
1904, Received the degree of A.M. from the University of Chicago.
1904–14, Engaged in field research in ethnology in the Philippine Islands, and in teaching, writing, and graduate study.
1914, Received the degree of Ph.D. from Columbia University.

The long vacancy in this important position was a great hindrance to the work of the other departments of the Garden, and the development of the library itself was greatly retarded.

Herbarium Assistant.—The increase of herbarium duties made additional assistance imperative if the collections were to be given proper care and supervision. On April 1, the temporary services of Dr. Alfred L. Gundersen were secured, and on December 23, 1914, he was regularly appointed as herbarium assistant for 1915.

Dr. Gundersen's academic and professional experience is as follows:

1897, Received the degree of A.B. at Stanford University.
1897–99, Student, University of Minnesota.
1901, Teacher of Botany, High School, Sauk Center, Minn.
1901–03, Teacher of biology, High School, Greeley, Colo.
1904–05, Assistant in physics, Wesleyan Univ., Middletown, Conn.
1905–07, Graduate student, Harvard.
1907, Received degree of A.M. (Harvard).
1907–10, Graduate student, Universities of Lille and Paris.
1910, Received the degree of *Docteur de l'Universite de Paris (sciences naturelles)*.
1910–13, Assistant, Arnold Arboretum, chiefly in connection with nomenclature in the *Bradley Bibliography*.

Miscellaneous.—The increase of our plantations made necessary the appointment, in the early spring, of an additional gardener,

William S. Allt, making a total of four besides the head gardener. Mr. Allt took the course for the training of gardeners at Kew in 1909–10, and holds the Kew gardener's certificate.

The work of the Garden demands at least four gardeners during the outdoor season, but at present three men are sufficient for the indoor work in winter. We have arranged with one of the gardeners to act as fireman in the winter, thus giving him continuous employment, and making possible three shifts of eight hours each in the boiler room without engaging an extra man.

The labor of mounting several thousand herbarium specimens has occupied most of the time of one assistant, Miss Margaret Mann, who has also given stenographic assistance in the office, and laboratory and field assistance to the curator of plant breeding.

Department of Public Instruction

Summary of Elementary Instruction.—A rather full statement of the development of our elementary instruction was published in the Botanic Garden RECORD for October, 1914, and a repetition of the details is not necessary here. The various phases of the work include children's gardens, the distribution of penny packets of seeds for the planting of home gardens (25,000 distributed during 1914), the first annual children's garden exhibit, the supervision of children's home gardens (500 visited during July and August, 1914), visits by classes from public and private schools, talks and addresses by members of the staff, before local organizations and at local schools (53 given during the year, with a total of over 10,000 auditors) and especially the conducting of regular Garden classes for adults and children, in the laboratory building, plant houses, and grounds (266 class exercises and lectures, with a total registration of 506, and a total attendance of 7,214).

Course for Preparation of Teachers.—A course for the preparation of teachers of children's gardening, along the lines projected in my annual report for 1913, was inaugurated in January and continued until November 14. So far as the Garden has been able to ascertain, this is the most thorough course for the preparation of teachers for such work ever offered by any institution. It will be repeated somewhat enlarged in 1915.

This course sets a new standard of requirements for the teach-

ing of children's gardening, and will tend to secure the recognition of that work, not merely as a pleasant diversion from the time-honored work of the class room, but as an educational discipline of quite new and very desirable possibilities. The fact that children's gardens produce material results in the form of radishes, lettuce, and flowers is apt to obscure in some minds their real value, and true purpose. Their object—the thing that really justifies their introduction into elementary schools—is not the crops that result, but their capacity to contribute to the education of children an essential element not supplied in so large measure by any other subject. And by this we do not mean merely elementary information about plants, but the enlarged outlook and added interest in life, and the peculiar mental discipline and moral gain, secured by successfully raising living plants from seed, and by all the attendant thought and operations involved in planning a garden and carrying it through to a successful conclusion. This is why the value of children's gardening is not confined to large cities, but may be realized also in villages and even in country schools. It is highly fitting that the Garden should take active part in securing a wider recognition of the value of any phase of plant study as an integral part of public education, especially when, by so doing, it may *ipso facto*, render a desirable service to the community.

Prospectus for 1915.—The first Prospectus of Courses offered by the Garden was published in the RECORD for January, 1914. Twenty-nine courses were there listed, together with information as to what opportunities the Garden could offer to the city schools.

Cooperation with Schools.—Early in the spring, arrangements were made with the Garden by Pratt Institute for our giving a regular course of instruction in children's gardening to their senior kindergarten class. The Garden was, of course, reimbursed by the Institute for the special privileges it enjoyed. A request was also made by a well known private school of New York, for a somewhat similar cooperative arrangement, but our own educational work had assumed such proportions that we were not able to enter into this cooperation.

Attention is here called to the appended report of the curator

of public instruction, recording the increasing use of the Garden's equipment by the biology classes of the city high schools.

First Annual High School Day.—On May 23 the New York Association of Biology Teachers and their friends met at the Garden, by invitation, for the first annual high school day of the Garden. The first hour was occupied by a conference in the laboratory building on the general subject of how the Garden can become most useful to the high schools in connection with their botanical instruction. This was followed by an inspection of the buildings and grounds. A full report of the meeting appeared in the RECORD for July, 1914.

First Annual Children's Garden Exhibit.—On September 24–26 was held the first annual Children's Garden Exhibit. There were 27 classes of exhibits, all confined to vegetables and flowers raised by children. In many cases the plants were raised from seeds supplied by the Garden in penny packets last spring, but exhibits were not restricted to these. Twenty-seven silver medals were awarded as first prizes, thirty bronze medals as second prizes, and forty-six certificates of honorable mention.

For the best exhibit from any one school a bronze statuette of Victory (modern) was awarded as a trophy to P.S. 152. This trophy is to become the property of the school that wins it three times. A second prize consisting of a Norfolk Pine (*Araucaria excelsa*) was awarded to P.S. 129, and certificates of honorable mention to Public Schools 54, 66 and 153.

Considering that this was the first exhibit held by the Garden, the results were more satisfactory than had really been anticipated, and there is every indication of even greater success next year.

Conferring of Certificates.—The satisfactory completion of regular courses of instruction at the Garden is recognized by the conferring of a certificate. During September seventy certificates were conferred on as many children for the completion of Course 1, Outdoor Garden Work. The award of this certificate means regular attendance, twice a week, for four and five months, and a satisfactory performance of assigned work. Children were required to bring written excuses when absent, and often parents would take the pains to call in person and explain the absence of

their children. This indicates a real appreciation of the work on the part of parents.

On November 21, formal exercises were held in the laboratory building in recognition of the completion of the first course of study for the preparation of teachers of children's gardening. An address was given by Dr. Gustav Straubenmüller, associate superintendent of schools of New York City, on the "Educational Value of Children's Gardens." Certificates in Children's Gardening were awarded to the seven young women who had completed the course.

Need of Additional Instructor.—Neither the curator of public instruction nor the instructor took the regular month's vacation to which they were entitled during the summer. This, of course, is voluntary service, and cannot be expected annually. On account of the children's gardens, the summer months are among the busiest, and the work last summer was much more than could be handled well by our available staff. Furthermore we had no one competent to carry on the work in case of enforced absence of the instructor from illness or otherwise. For 1915 the instructor should be made assistant curator of public instruction, and a new instructor should be appointed to begin not later than July 1.

Public Demand for this Work Demonstrated.—The facts as set forth above, and more fully in the appended report of the curator of public instruction, clearly demonstrate the extensive demand in Brooklyn for opportunities of this nature. Much as has been accomplished, the amount could easily have been doubled had we not already reached the limits of possibility with our present cramped quarters.

Investigations

Attention is called to the report of the curator of plants, recording the completion of the manuscript of his work on the flora of New York and vicinity. This is now in the hands of the printer, and will be published in January, 1915. The work will appear as a Memoir of the New York Botanical Garden, in accordance with an agreement to that effect between the New York and the Brooklyn gardens at the time the author resigned from that institution to assume his present position. An intensive study

of the vegetation of Long Island has also been initiated during the year by the curator of plants.

Researches in experimental evolution and heredity have been carried on by the curator of plant breeding, and studies in plant pathology by the curator of public instruction.

The laboratory assistant, under the supervision of the curator of public instruction, has prosecuted studies of the slime moulds (Myxomycetes), resulting in a substantial contribution to our knowledge of their life history, and he has also made investigations of diseases of the potato. In this connection, he was granted leave of absence from the Garden from April 4 to October 1, spending this period with one of the larger and more progressive growers in Aroostook county, Maine. The potato crop in this county was about twenty-five million bushels last year, and shipments from there supply a large part of the seed tubers for the eastern United States, as far south as the Gulf states. The discovery of "powdery scab," a serious and recently imported disease of the potato, causing large financial loss, has been followed by thorough investigations by both the State and the Federal Departments of Agriculture, with the hearty cooperation of the growers. The situation offered excellent opportunities for an investigation of the nature and methods of eradication of the disease.

Publications of the Garden

Record.—The four quarterly issues, comprising volume three, contained 142 pages—two pages more than during 1913. It has not been possible to increase the frequency of issue of the RECORD to bi-monthly, as recommended in the preceding annual report, but the situation fully justifies this, and it should be accomplished as soon as circumstances will permit.

Contributions.—One number of the *Contributions* (No. 8) appeared during 1914.

Leaflets.—The Second Series of the *Leaflets* comprised 12 numbers, appearing at weekly and bi-weekly intervals from April 1 to October 21. As a new feature several numbers were issued as a special "Children's Number," or "Arbor Day Number.." The mailing list has steadily grown, and the publication goes to several states besides New York.

American Journal of Botany.—The first volume comprises ten numbers with a total of 550 pages. Probably no less propitious year for launching a new scientific publication has occurred for over a decade. The general financial depression of the entire business world resulted in a very limited response to our appeal for advertisements, and the advent of the European war resulted in the cancelling of one contract by a German firm, and the failure of several other firms to renew. The amount of the deficit met by the Garden is shown in the financial statement appended hereto. The subscription list is steadily growing, and there is every prospect that the *Journal* will, within a year or two, become nearly, if not quite self-supporting.

It should be borne in mind, in this connection, that the Botanic Garden was established for the purpose of advancing and diffusing a knowledge of plant life, and the founding of the *American Journal of Botany,* in cooperation with the Botanical Society of America, is one of the most valuable services the Garden has been able to render to botanical science. It has also, in several ways, been of very considerable advantage to the Garden to be its publisher. It is to be hoped that the present arrangement with the Botanical Society of America, which expires in December, 1916, may be renewed at the end of 1915 for a longer term of years.

Seed List.—As noted above (p. 25), the first Seed List was issued in December, and copies were mailed to other botanical institutions offering seeds in exchange.

The Public and the Garden

Response to Opportunities Offered.—An unmistakable evidence of the interest of the general public in the work of the Garden is the response that has been given to the various opportunities we have been able to offer. From public and private schools, from clubs and other organizations, as well as from individuals the demands have been as large as could well be met. Requests for our publications, for information about plants and their care, for the conducting of parties to view the collections, indoors and out, and for the accommodation of classes have steadily increased since the building and plant houses were first occupied.

Attendance.—The closing of our grounds to the public, on

account of grading operations and walk-making, naturally reduced our attendance to near the vanishing point. Moreover, on account of lack of sufficient space to arrange our indoor collections suitably for labeling and public exhibition, no effort whatever has been made to attract visitors to the conservatories. The second section of the plant houses, containing the collection of tropical economic plants, was not opened to the public until May 23. Notwithstanding these facts, a total of 11,180 visitors to the conservatories has been recorded. This is in addition to the total attendance of 7,214 at class exercises, making a grand total of 18,394, or over 1,500 a month.

Meetings and Receptions.—Meetings of outside organizations, and receptions held at the Garden during the year included the following:

February 17. Reception to Public School Teachers, inspection of building and conservatories, and conference on How the Garden may be of Greatest Service to Local Schools.

May 23. Reception to the New York Association of Biology Teachers and their friends. Inspection of buildings and plantations, and conference.

May 26. Kezhikone Camp Fire Girls, of the Y. W. C. A., to visit the plantations.

October 22. Meeting of members of the Board of Trustees of the Brooklyn Institute of Arts and Sciences, as guests of the Committee on Botanic Garden, to inspect the work done during the year, especially in connection with the contracts for grading and the construction of new walks.

December 11. Meeting of the Associated High School Biology Clubs of New York City. Program and reception.

Acknowledgments

It is a pleasure here to record, with our best thanks, the following gifts, for which personal acknowledgment has already been made:

February 25. From Dr. H. M. Denslow, 39 herbarium specimens, mostly orchids.

May 29. From Mrs. N. L. Britton, framed illustrations of native wild flowers (Stokes fund pictures).

July 3. From Col. Robert B. Woodward, a check for $1,000, to be used where most needed.

September 10. From Mrs. Annie Morrill Smith, her botanical library of about 792 books, 508 pamphlets, and 276 parts, *et cetera.*

September 16. From Professor W. F. Ganong, living material of fifty species of plants and six packages of seed.

September 28. From the donors of the original endowment fund of the Garden, who wish to remain anonymous, checks for $1,000 each.

September 30. From Mrs. J. D. Prince, Flatbush, 27 living plants for the conservatories, representing 23 species.

November 3. From Dr. N. L. Britton, herbarium specimen of *Aster Herveyi.*

November 6. From Mr. George D. Pratt, a collection of 100 valuable autochrome plates of orchids, made by Professor Shattuck, of Vassar College.

November 28. From Dr. Louis I. Dublin, 39 books and 221 pamphlets on biological subjects.

The following gifts are also hereby gratefully acknowledged: Dr. D. T. MacDougal, photograph of *Vitis quadrangularis;* Mrs. Charlotte C. Henry, Flushing, L. I., fruits of *Ginkgo biloba* from the Prince homestead, Flushing; the United States Department of Agriculture, Bureau of Plant Industry, seeds of various species, two living plants of *Eremocitrus glauca,* and 13 living specimens of economic plants; Mrs. G. T. Lawrence, Flatbush, one cactus of the genus *Cereus;* Miss May Shepperson, two living plants of *Monarda punctata;* Dr. Ralph H. Pomeroy, Brooklyn, one living plant of *Persea americana;* Mr. James MacPherson, 300 fresh seeds of *Arum orientale albispathum;* Mr. and Mrs. J. Otis Mageworth, Brooklyn, living specimens of several species of native wild plants; Miss Agnes Vinton Luther, Newark, N. J., living plants of three species; Dr. Harry B. Shaw, Brooklyn, seeds of *Chrysalidocarpus lutescens;* Prof. Charles E. Bessey, Lincoln, Neb., seeds of *Prunus Besseyi,* and photograph of *Cereus giganteus* in blossom; Mr. D. Northrup, Brooklyn, living plants of *Trillium cernuum,* from Cold Spring Harbor, L. I., and *Cypripedium acaule;* Mr. J. H. Mills, canna tubers; Mrs. E. Wollaston, Unionville, Pa., plants of *Caltha palustris;* Mr. D. Steengrafe, two living

coffee trees; Mr. Alfred T. White, seeds of *Sequoia gigantea;* Mr. Norman Taylor, *Index Kewensis, Supplementum IV;* C. Stuart Gager, five books and 38 pamphlets; William Wood & Co., one pamphlet; Prof. John W. Harshberger, The Vegetation of South Florida, one volume; J. R. de la Torre Bueno, Flora Nicaraguense, two volumes; Prof. A. J. Ewart, Melbourne, Australia, 7 pamphlets; George H. Stevens, Index to Patents, Technology, and Bibliography of China Wood Oil (Tung Oil), 1 vol.; Utrecht Botanisch Laboratorium, 2 vols.; Miss J. Van Ness, Brooklyn, seeds of hickory with pink cotyledons; Mr. Alfred T. White, Brooklyn Park Reports, 1861–1873, 1 vol.

Acknowledgment, with many thanks, is also made of the following:

CONTRIBUTIONS TO THE BOTANIC GARDEN COLLECTIONS FUND, 1914

J. A. Mollenhauer	$ 100.00
Caroline V. Latimer	15.00
Julie Husson	5.00
William G. Low	20.00
Mrs. N. Matson	5.00
William J. Kelley	10.00
Herman Stutzer	50.00
Dick S. Ramsay	25.00
E. LeGrand Beers	50.00
Col. Robt. B. Woodward	500.00
Mary Van Norden	1.00
Mrs. L. V. Happel	10.00
Isaac S. Coffin	5.00
Mrs. F. Willenbrock	2.00
Theodora Grupe	1.00
Dr. G. R. Butler	5.00
Frank Bailey	25.00
H. F. Gunnison	5.00
Adolf Muller	2.50
Miss J. W. Latimer	10.00
Miss C. C. Calkins	2.00
Frank Lyman	25.00
D. V. B. Hegeman	10.0¢
A. Augustus Healy	1,000.00
J. McCallum	5.00
	$1,888.50

Financial Matters

Municipal Appropriation for Maintenance.—As shown in the appended financial statement, the municipal appropriation for maintenance for 1914 was $37,636.17, and while this was larger by $8,176.17 than the appropriation for 1913, the needs of the Garden were also very much larger, on account of our having moved into our own building, which necessitated a number of new employees; and also on account of larger grounds and more intensive cultivation, necessitating additional laborers. The cost of the ordinary maintenance and construction work so greatly exceeded the amount appropriated by the city that contributions for this purpose from private funds were necessary to the amount of $4,092.13. This, of course, is in addition to the amounts expended for the purchase of books, living plants, and other additions to the scientific collections, and a portion of the expense of the educational work, all of which is charged to private accounts. The municipal appropriation for maintenance for 1915 should have been increased by at least $4,000 over the 1914 appropriation, but instead of that there was a decrease of over $500.

The appropriation for 1914 was at the rate of seven tenths of one cent ($0.007) per inhabitant of Greater New York, two hundredths of one mill ($0.00002) for each dollar of assessed valuation of real estate in Brooklyn, or less than five thousandths of one mill ($0.0000046) for each dollar of assessed valuation of real estate in Greater New York.

If we consider Manhattan and the Bronx as a unit, and omit the Aquarium from our consideration on account of its central location, the following comparison may be made:

MUNICIPAL APPROPRIATIONS FOR 1914 PER INHABITANT OF GREATER NEW YORK (POPULATION 5,333,537) FOR MUSEUMS, BOTANIC GARDENS, AND ZOOLOGICAL PARK

	Total Appropriations (Except Aquarium)	Appropriation per Inhabitant
Manhattan and Bronx	$707,163	13.2 cents
Brooklyn:		
Total, all institutions	162,608	3.0 cents
Botanic Garden	37,636	0.7 cent

It may be argued by some that the location of any given institution in one borough rather than in another is an irrelevant detail since each belongs to the city as a whole, and their privileges are open to all alike. While *a priori* this may seem to be true, in practice it is not, because the institutions that are more centrally located with regard to the future growth of the city and the development of new lines of rapid transit, as are the Brooklyn Museum and the Botanic Garden, will always be more easy of access and at a smaller expenditure of time and money. Of the total visitors to the Brooklyn Botanic Garden and Museum, very few indeed could spare the time necessary for them to reach the more distant institutions in Manhattan and the Bronx. This is especially true for classes from the public schools who are taking advantage of museum and botanic garden opportunities in increasing numbers.

Municipal Appropriation for Building.—The appended financial statement shows, as last year, an unexpended balance of $5,789.31 on the appropriation (C. D. P. 200L) of $100,000 for the construction of laboratory building and plant houses. It is proposed to use this balance in connection with a new appropriation (if granted) of $65,000, which has been requested for the construction of the next two sections of the laboratory building.

Municipal Appropriation for Grading.—The appended financial statement shows an unexpended balance of $1,042.65 on the appropriation (C. D. P. 200J) of $40,000 for grading, top-soiling, and related improvements. This amount, and about $5,000 more will be needed to complete the top grading and top soiling. A request for the additional $5,000 for this purpose is now before the Board of Estimate and Apportionment.

Municipal Appropriation for Constructing Walks.—An unexpended balance on the original appropriation (C. D. P. 200K) of $30,000, for the construction of walks, stone steps, bridges, etc., is $5,012, as shown in the financial statement appended hereto. This amount will be sufficient to cover the cost of the walks on the south addition opposite the Willinck Entrance to Prospect Park, and plans and specifications covering this work will be submitted to the Board of Estimate and Apportionment for their approval early in January, 1915.

Private Funds.—The total income for the year on private funds accounts was $21,261.63, or nearly 60 per cent. of the amount appropriated by the city for maintenance. This does not include the payment of $453 for raising the chimney, which did not pass through the office of the treasurer, and which raises the total to $21,714.63. This is the largest amount credited to private funds accounts since the establishment of the Garden. Of this amount over $19,700 was received by subscription.

FIG. 6. Site of the esplanade leading to the Museum Building. View facing south from Museum embankment. June 17, 1914.

The Needs of the Garden

Urgent Need of Additional Buildings.—The following quotation is from my letter of July 21, 1914, addressed to Mr. H. B. Elliot, of the Bureau of Contract Supervision of the Board of Estimate and Apportionment, in response to his request for information on the subject:

"May I summarize below the facts which make additional laboratory building and conservatories urgent to the point of necessity, in view of the purposes for which the Garden was established, and in view of the extent to which our development has already proceeded.

"1. No suitable place in the Garden properly to care for and house during the winter our agricultural tools and implements, which are the property of the City of New York.

"2. No room in our building large enough to assemble an audience of over forty to fifty persons, although the total attendance at our classes for the month of June was approximately 1,500 students.

"3. Requests from high schools and grammar schools asking for accommodations for their classes in our building and greenhouses, amounting to almost double our ability to meet the demand, and this, in the first year of our offering this opportunity.

"4. Wholly inadequate and inappropriate office accommodations for our administrative force, as I think was quite evident to you on your visit to the building.

"5. No provision for a public toilet on our grounds, notwithstanding the fact that, in addition to the 1,500 pupils attending our classes monthly, we have a large attendance of casual visitors to the conservatories and grounds.

"6. The only entrance to our building is through a door which is intended to be a service door almost exclusively. This is the entrance from Washington Avenue,—wholly inappropriate for a city institution like the Garden, and at times very annoying and disagreeable for visitors, who are obliged to use this door, often at times when coal is being delivered in front of it, or when large numbers of workmen are entering or leaving.

"7. Lack of room to install, in a way to make it accessible, more than half of our herbarium, of over 100,000 specimens. The accessibility of this herbarium is absolutely necessary in order that we may properly administer our collections of living plants in the conservatories and grounds. This herbarium at present occupies a room which is sorely needed to relieve the congestion of classes.

"8. Lack of sufficient greenhouse space to properly care for such plants as we now have, making it practically impossible for us to increase our collections, on account of the impossibility of securing a sufficient diversity of temperature and humidity conditions for the various kinds of plants. The educational value of this phase of our work in correlation with the instruction in the public schools of the city can hardly be overestimated, but it is not possible for us to expand it at all. Ninety-five per cent. of the plants we now possess have been presented to the Garden as gifts, and are open to the general public, free of charge, every day in the year. As soon as we have other accommodations, we shall be able to fill the space at once with other gifts, without expense to the city.

"9. The construction of the remainder of the conservatories will give us the service basement which is so urgently needed for storing our agricultural implements and tools, and for the accommodation of our workmen.

"10. Finally, may I emphasize once more the fact that if this appropriation for which we are now asking is granted, it will in all probability

be at least eighteen months and possibly longer, based on our experience with the present section of the building, before the new quarters will become available for us. By that time our need for them will be increased many fold.

"The postponement of this appropriation at this time may mean the postponement of the completion of the structures for a period of two or three years, if not longer."

Propagating House and Nursery.—My two preceding annual reports have contained the following paragraph:

> "It is already clearly evident that, within a very short time after the completion of our plant houses, their entire space will be needed for our exhibition collections, and the work of instruction and investigation to which two of the houses are now assigned. This will necessitate the erection of a propagating house where the collections may be suitably prepared and cared for, and it will also become increasingly urgent that we have a garden area adjacent to the propagating house for nursery and experimental purposes."

The "very short time" has elapsed, and we are already confronted with the anticipated situation. We have now more plants for exhibition purposes under glass than can be properly installed, and about twice as many pupils in our classes as can be accommodated in the plant house devoted to this purpose. There is, in fact, hardly one square foot of space to serve the purposes of a propagating house.

Need of Increased Appropriation for Maintenance.—A new and rapidly growing institution will, of course, have increasing annual needs, especially during the first few years of its development. The beginnings of the Garden were very modest in every way, modest in equipment, modest in plans, modest in size of staff, and modest in salaries. They have, during these initial four years, remained modest in every point except plans, and the enlargement of our plans has been consequent upon the unexpectedly large demands made upon the Garden by the public. Even now our plans cannot be called ambitious. We have indulged in no luxuries of equipment or accomplishment, and, as stated in my preceding report, "it is only by an economy so rigid as to imperil efficiency that the Garden can now be run with the sum annually appropriated by the City." In fact, it has been clearly shown above that without private contributions the necessary work of the Garden could not have been done.

The salaries of curatorships in the Garden are less than those paid to assistant teachers in the city high schools, and about $1000 less than the salaries of first assistants (heads of departments) in our high schools; they are out of proportion to the academic preparation, experience, reputation, and high class of professional services required of the incumbents.

In connection with the matter of salaries, two other considerations must also be kept in mind. The first concerns the well known fact that the cost of living in Greater New York is appreciably greater than in most other places where relatively higher salaries are paid for botanical services. The second refers to the extremely advantageous perquisites attaching to professorships of botany in our best universities, and to positions in some of our secondary schools on private foundations. These include:

1. *Long vacations,* giving a period of from three to four months, every summer, of entire freedom from administrative and other routine duties, offering opportunity, not alone for physical and mental recuperation, but for study, research, and writing, or such other occupations as tend to increase one's efficiency and enhance his value to the institution he serves. While the duties required of our members of staff are, for the most part, not of a nature to make a long summer recess essential, the long vacation has more or less weight in adding to the attractiveness of other positions. Nevertheless it is largely counterbalanced by certain attractive features of curatorships in the Garden.

2. *A sabbatical year,* offering leave of absence on either full or part salary, and thus affording opportunity for travel, exploration, or extended studies. I believe that the institutions profit quite as much as the individuals from sabbatical leaves, and that such an arrangement should be kept in mind as a desirable goal for the Garden ultimately to reach.

3. *Service pensions.* The existence, or otherwise, of service pensions is often the deciding factor in the choice of one position rather than another, and has enabled many institutions to retain desirable men who would otherwise have gone elsewhere. Some museums as well as universities and other schools now provide for retiring allowances, and this should be looked forward to by our own institution as a plan to be realized as soon as possible.

A Garden Membership.—The development of the Garden has now reached a stage where the organization of a Garden membership is very desirable, and after the contemplated reorganization of the Brooklyn Institute of Arts and Sciences, early in 1915, which will doubtless provide for a class of Botanic Garden members, the plan should be carried into effect as promptly as possible.

Increased Endowment.—If the initial cost of constructing the Japanese garden ($10,050) be deducted from the total amount of our income from private funds from 1914, the balance is something over $11,664, which, capitalized at 5 per cent., represents a sum of approximately $250,000. In other words, if the work of the Garden were to remain practically stationary, we should need annually in addition to municipal appropriations, an amount equal to the income on an endowment of a quarter of a million dollars.

In June the director received a pledge of $50,000 toward a larger endowment, provided at least $50,000 additional could be raised. Subscriptions toward this sum, amounting to $35,000 were received up to the time when the European war broke out. Since then it has not been deemed wise to endeavor to push the canvass for additional subscriptions, but this should be resumed at an early date, with an endeavor to bring the total endowment to not less than $250,000, and ultimately to at least twice that amount.

Accompanying Papers

The following papers and documents are appended as a part of this report:

1. Annual report of the curator of plants.
2. Annual report of the curator of public instruction.
3. Annual report on the library.
4. Financial statements covering municipal appropriations and private funds.
5. Appendices 1–8.

Respectfully submitted,

C. Stuart Gager,

Director of the Garden.

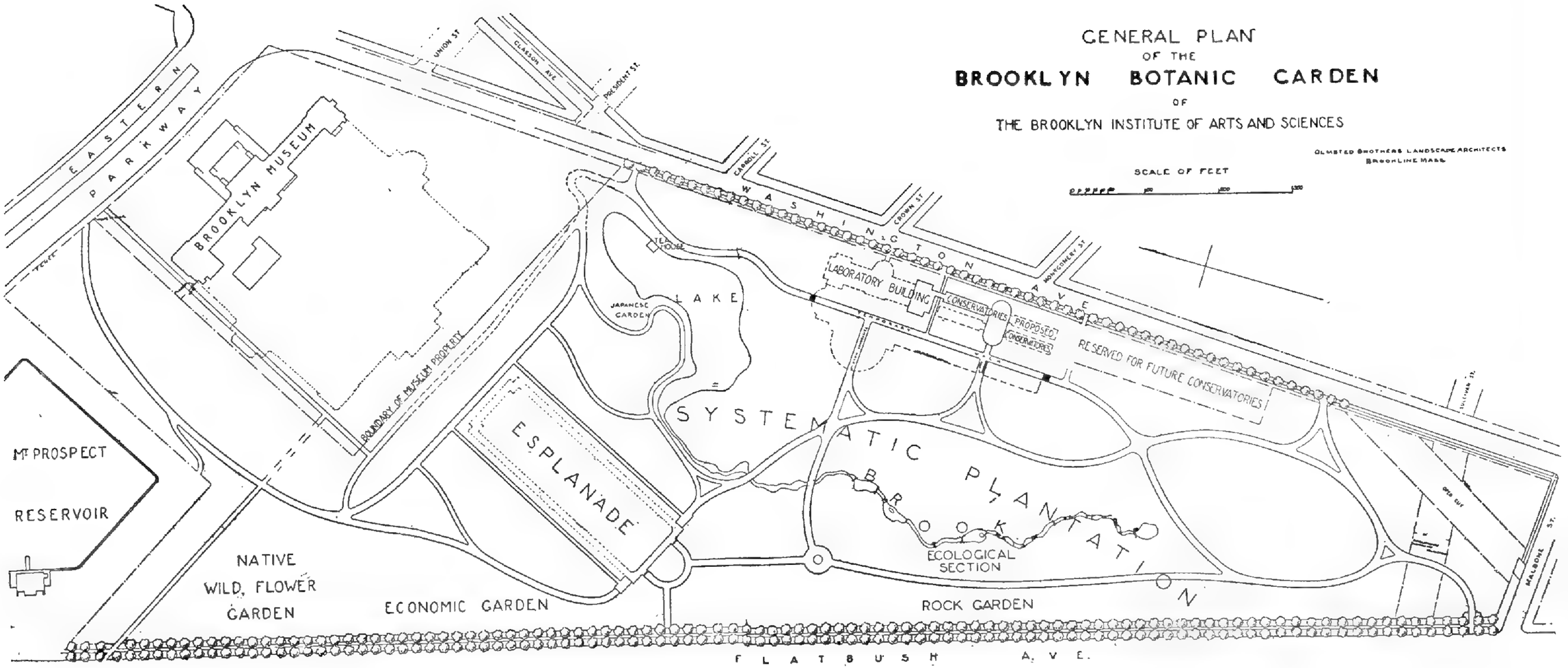


FIG. 7. Plan of the Brooklyn Botanic Garden.

REPORT OF THE CURATOR OF PLANTS FOR 1914

DR. C. STUART GAGER, DIRECTOR.

Sir: I take pleasure in submitting my report as Curator of Plants for the year ending 31 December 1914.

General Maintenance and Construction Force

As usual this force has carried on all regular maintenance work such as mowing, cleaning, and small repair jobs on the grounds. Work was started on March 17 and the force was laid off for the winter on November 14. We employed an average of 19 laborers per week for the season, varying from 7 in slack periods to 30 in our busiest weeks. Besides the purely maintenance work, this force has carried on the following constructive work: digging trench for evergreen hedge near building; clearing ground and getting it ready for children's garden; digging and filling 1,283 feet of trenches for water pipes, many of which had to be lowered owing to changes of grade; excavation for and construction of cinder path along the wild flower walk in Section II; grading the area south of the museum embankment including the northern end of the esplanade, work necessitated by the change in plan, a total of about 1,700 cubic yards of subsoil and 1,800 cubic yards of topsoil being moved in this work; digging 156 large holes for trees on esplanade and filling same with topsoil; grading area of experimental plot in nursery and building steel wire fence around same;* cleaning of all catch-basins, man-holes and hundreds of feet of the old drainage system, preparatory to the attachment of the newly constructed drainage system to the old mains; grading and finishing the area along Flatbush Avenue near the old site of Section III; grading near the site of the proposed steps from the circle in the path to the meadow, along Flatbush Avenue; building a new dam in the brook; stripping topsoil from and grading 600 feet of path lines, improperly graded by the grading contractor in 1913; grading and topsoiling the area near the conservatories and laboratory building; constructing bulkhead and filling behind

*Through the courtesy of the American Steel and Wire Co. one of their foremen supervised the construction of the fence.

same near the former beach at the lake; preparing 2,760 feet of path edges for the sodding contractor; and a good deal of the preliminary plowing, harrowing, etc., on a soil improvement scheme planned to build up the fertility of the soil recently graded by the contractor.

Much of this work leaves little to show for the time and money spent on it, and, in our grading operations, necessitated by changes of plan and the incompetence of the earlier grading contractors, a good deal of time has been spent in removing rocks and boulders. This force has very frequently loaned men and horses to the gardeners, and there has been some work done by them, also, for the Japanese garden. This work was under the immediate supervision of our regular foreman, Mr. Herman Kolsh.

Gardening Force

During the active growing season this force has consisted of four gardeners under the head gardener. The latter position was held by Mr. J. V. Borin until March 10, and March 16, Mr. Montague Free was appointed. Besides the usual gardening maintenance work this department has done constructive work as follows.

1. Excavation and construction in the interior of the large conservatory, and installing the nucleus of the economic collections. This house was opened to the public for the first time in May. The collection is planned to consist of tropical economic plants exclusively and it is hoped that permanent planting-out of the larger plants will be possible. Structural alterations to the framework in the late fall will make it necessary to postpone the permanent planting-out of the plants in this house until the spring of 1915. A concrete water basin and small rivulet were built in this house, and also a rock-work bridge or lookout. The house will contain no benches.

2. The collections of *Chamaecyparis, Taxus* and *Cephalotaxus* were removed from the site of the Japanese garden to a new location along Washington Avenue.

3. About 900 shrubs and trees were planted on and near the central meadow, as part of the general systematic collection. A

large part of these plants were in our own nursery, which has been reset, and some plants have come from outside nurseries. This planting completes, in broad outlines at least, the scheme outlined in a former report, which has been prepared with the cooperation of Mr. Caparn. There are still many hundreds of plants to go in, but the general outlines of the scheme are now easily seen on the grounds.

4. Additions were made to the local flora planting where necessary, particularly along the Wild Flower Path, and about 150 *Rhododendron maximum* were added to the plantation in the spring. Some of the shrubs in the border planting here have been thinned out, such plants being used on the newly constructed border-mound.

5. About 700 packets of seed were collected in the different plantations, with a view to starting a seed exchange system during the coming year.

6. To the department of public instruction considerable of the gardeners' time has been given, and Mr. Free has given many lessons in practical gardening. Some time has also been given to the children's gardens and to the experimental plot in the nursery. Mr. Free spent the time from August 17–September 2, visiting public and private gardens in New England, and from the Botanic Garden at Smith College about 50 species were secured as cuttings, at that time.

Labelling and other Clerical Work

During the year very few show labels were made on account of the closing of the grounds, and the unusually large amount of other necessary work. Ninety-six lead labels and 52 signs were made during the year.

As before Mr. Cullen Adlerblum has acted as garden aid, and attended to the details of accessioning, the collection of specimens, keeping of the phenological record, and such other duties as occasion demanded.

The following table indicates the number of accessions during the year, and the total number to date.

PLANTS DERIVED DURING 1914

By purchase	823
By exchange	162
By gift	70
By collection	6
By seed	496
Total	1,557

Accession numbers, 3,860–5,417 inclusive, were assigned during the year. Our records show, as of December 31, 1914, that we now have in cultivation 1,029 genera and 4,068 species, of which nearly 1,000 are wild within 100 miles of the Garden. During the year we have also received 914 packets of seeds, and 64 plants and cuttings have been sent out as exchanges.

Phanerogamic Herbarium

During the year the Garden has increased its phanerogamic herbarium by the following:

Herbarium of E. L. Morris, purchased	9,046
Herbarium of Long Island Historical Society, deposited, about	7,000
Collections by the staff, at the Garden, and on Long Island, about	1,800
Miscellaneous small collections	200
Total	18,046

During the late spring and in the autumn I have had the assistance of Dr. Alfred L. Gundersen in the herbarium. He has resorted many genera and families, adding about 20,000 sheets of which about 10,000 were mounted at the garden during the year. It is a pleasure to report that the collection is now, for the first time, readily available to all. The families are arranged according to the sequence of Engler and Prantl, with both genera and species alphabetical. Much revisionary work is still necessary to make the collection of first rate scientific value. There have been from one to two assistants helping in this department for parts of the year.

The need for doubling our present equipment of herbarium cases is urgent. At present about half of our mounted sheets are not as readily accessible as they should be, and many are stored

in temporary cases outside the regular sequence. Even with double the present number of cases, all of the Long Island collections will have to be moved from the herbarium room, on account of overcrowding.

Personal Activities

During the early spring I submitted a proposition to you for the botanical exploration of Long Island which met with your approval, and I have already visited many places and collected numerous specimens for this purpose.

The editorship of *Torreya* has occupied some of my time, and the answering of inquiries and determination of specimens is becoming greater each year. During the last week in December I sent off for final printing my book on the flora of New York and vicinity, upon which I have been working for the past five years. It is to appear as a Memoir of the New York Botanical Garden.

Other activities include serving on the executive committee of the Department of Botany of the Institute, on the local flora committee of the Torrey Botanical Club, and as one of the board of managers of the Wild Flower Preservation Society. I have also retained my connection with Bailey's Standard Cyclopedia of Horticulture.

Respectfully submitted,
NORMAN TAYLOR,
Curator of Plants.

REPORT OF THE CURATOR OF PUBLIC INSTRUCTION FOR 1914

DR. C. STUART GAGER, DIRECTOR.

Sir: I beg to submit herewith my report as curator of public instruction for the year ending December 31, 1914.

Regular Courses of Instruction

In the first prospectus outlining the courses offered by the Garden in 1914 (see RECORD **3**: 1–9. Jan. 1914), twenty-nine courses in gardening, nature study and advanced and research work in botany were offered. Of this number, nineteen were given during

the year with a total registration of 510, and a total attendance of 7,214, twelve of the courses being taught by Miss Shaw. Following are the courses given in 1914:

No. 1. Garden practice.
No. 2. Nature study.
No. 3. Back yard gardens.
No. 4. Kitchen gardening.
No. 5. The small flower garden.
No. 6. Indoor plant culture.
No. 7. Landscape design.
No. 9. The garden week by week.
No. 11. Elementary botany.
No. 12. Nature study.
No. 13. Soils and agricultural principles.
No. 14. Plant propagation and greenhouse work.
No. 15. Fungous and insect pests.
No. 16. Children's garden practice.
No. 17. Fall garden work.
No. 18. Pedagogy of botany.
No. 19. Practical garden work.
No. 25. Seminar (on heredity and plant breeding).
No. 26. Journal Club.

A detailed summary of the work in children's gardening is given in the Brooklyn Botanic Garden RECORD 3: 101–112. October, 1914. To the account there recorded may be added an appreciation of the interest of Miss Sophie Pfuhl, a student of the summer school of Teachers College, Columbia University, who spent three weeks at the Garden studying methods of such work with children. Her interest in one instance won the enthusiastic approval of a class of older boys whom she took on a trip to the museum of the New York Botanical Garden, in the Bronx, to study especially the economic plants and their products, Miss Pfuhl kindly defraying all expenses of fares and refreshments.

Nine of the courses mentioned above (Nos. 11–19) are embraced in a *Course for teachers of school gardening,* a subject which is fast growing in public interest. Ten teachers registered for this work, of which number seven completed the year's requirement and received Certificates in Children's Gardening at the exercises held November 21, 1914.

In connection with the more advanced and research courses, tentatively offered for the first time in 1914, several suggestions might be here recorded. Notwithstanding the crowded condition of our present temporary quarters, a number of teachers and others availed themselves of the opportunity to use the laboratory and greenhouse equipment for the purpose of carrying on advanced

botanical work. Not until the present incomplete building is extended, however, and the research rooms which are planned for are thus made available, can we hope to offer to outside investigators, not to mention our present staff, satisfactory facilities for this work.

It is further hoped that, after more room is provided, the near future will see some provision made for fellowships, which will thus enable us to offer to promising students and investigators facilities for carrying on botanical researches at the Garden. By the creation of such fellowships, as well as of more assistantships, in which the incumbent would give to the actual work of assisting only a portion of his time, while carrying on botanical investigations of his own, the Garden would secure at a nominal cost a very high grade of assistance, while at the same time helping materially to advance our knowledge of plants.

Another matter in connection with the encouragement of this advanced work at the Garden must be solved sooner or later; namely, the question of credit for such work in degree-giving institutions of higher learning. Most young graduates, as well as students of college rank, rightly look to the end of securing higher degrees such as doctorates with a view, at least in part, to the material assistance such degrees contribute toward the securing of positions in teaching or for the carrying on of scientific research. It is to be hoped that satisfactory arrangements may be made with several of the larger universities whereby such advanced work done at the Garden will be allowed proper credit toward a higher degree.

Public Lectures and Addresses.—The services of the instructor were in considerable demand for talks and lectures during the past year. Nine addresses were made by her during the spring, on agricultural and garden topics, before various teachers' associations, mothers' clubs, and other organizations. During the fall Miss Shaw gave five public addresses before similar organizations, one being given on October 30 at the Boys' and Girls' Industrial Exposition at Windsor, Vt. The curator of public instruction also during the year gave several addresses before various organizations throughout the city, and to visiting classes at the Garden.

Cooperation with Local Schools

Talks at Schools.—About twenty talks on garden making were given by the instructor during the spring before the pupils and teachers of various public and high schools throughout Brooklyn. Over 11,000 pupils have been in this way reached and influenced.

School Classes at the Garden.—Although the Garden was closed to the general public throughout the season on account of grading operations and the construction of new walks, a number of high schools and grammar schools as well as several private schools have visited the Garden conservatories and outdoor plantations, as well as the Japanese garden, and a few have utilized the laboratories for instructional purposes. An advanced class in botany from Erasmus Hall High School, for example, used the greenhouse laboratories during six periods in the spring for making experiments on various phases of plant physiology; while classes from the Commercial High School have also had a number of excursions and physiological demonstrations, at the Garden. Also, a class of thirty seniors in kindergarten methods from Pratt Institute came to the Garden at regular intervals from March till the middle of June for a course with the instructor in gardening and kindergarten work.

Conferences on Garden Making, Assistance in Home Gardening, etc.—The instructor has given largely of her time and energy in giving advice and other assistance to teachers and others at various schools and homes throughout Brooklyn, on the planning and planting of school and home gardens. About 500 home gardens were visited for this purpose during July and August. Also her time was in demand for judging flower shows and garden exhibits, and in presiding over and directing the activities of the New York Branch of the Nature Study Association. Other members of the Garden staff have naturally been called in consultation less often, but have frequently passed upon such problems as the disease and injury of plants, poisoning by gas, and other similar questions.

There is no doubt but that such encouragement and stimulation in the production of home and school gardens as has had its initiative in the Garden during the past year has already borne much fruit, and the future development of this line of work in such a favorable environment as the city of Brooklyn is practically limit-

less. It would in fact be a wise method of developing this important adjunct to modern education if all this work could be adequately supported financially and its administration centered at the Garden in the hands of one efficient head.

Study and Loan Material.—The main requests for such material during the past year have been for Petri dishes, filled with nutrient agar and sterilized ready for exposure. Several high schools, as well as the Brooklyn Training School for Teachers, availed themselves of this opportunity, and about 250 Petri dishes sent by these schools to the Garden were prepared and returned to the schools for use in their study of bacteria and molds of the dust and air of the schoolroom.

A few requests from schools for plant study material have also been filled; but our facilities for handling such requests remain at present very meager, owing to our crowded quarters, as well as to inadequate assistance in the collecting and preserving of such material.

FIG. 8. Class of boys in plant house.

Leaflets

In Series II of the *Leaflets,* fourteen numbers were issued, during April, May, June, September, and October, nine of which were four-page bulletins, one of eight, while the other four were illustrated and made each up of twelve pages, making a total of 80 pages, with 22 illustrations. The rapid exhaustion of most of the editions, and the increasing demand made by teachers for extra copies for use with their classes furnish ample evidence of the appreciation of the *Leaflets* by teachers and others, as well as of the rapidly growing audience reached by the Garden. One number, for example, on the children's Garden Exhibit, went to over 10,000 school children; while it was found necessary from time to time to increase the number of copies of *Leaflets* printed.

Field Meetings

April 29. Classes from Ethical Culture School, and P. S. No. 30. At the Garden.

May 6. Biology class from the Commercial High School Annex (Brooklyn). At the Garden.

May 26. Chiropean Club, of Brooklyn. At the Garden.

Oct. 3. Members of the Junior department of the American Association for the Planting and Preservation of City Trees. At the Garden.

Oct. 14. Class 4A from the Ethical Culture School. At the Garden.

October 21 and 22. Classes from the Berkeley Institute. At the Garden.

Oct. 31. The Department of Botany of the Brooklyn Institute, at Valley Stream, L. I.

Nov. 12. Classes from the Commercial High School. At the Garden.

Investigations

The research work done by the curator of the department during the year has necessarily been curtailed by growing administrative, editorial, and teaching duties; but as heretofore it has had to do largely with various plant diseases. In connection with this work, the curator joined a party of scientific men on a study

trip, lasting from July 30 to August 4, to the potato-growing sections of Rhode Island and northern Maine (see BROOKLYN BOT. GARD. RECORD 3: 116–120. Oct. 1914).

Gifts

Grateful acknowledgment is hereby made to the following firms for exhibits donated during 1914 for the purpose of illustrating lectures and talks on plants and plant products:

DONOR	EXHIBIT
Waterman Pen Company	Rubber exhibit and set of lantern slides.
E. B. Estes & Sons	Turned boxes and woods.
Edward Benecke & Brother	Foreign woods.
William Demuth	Briar wood.
Walter Baker Co	Set of lantern slides.
Shredded Wheat Co	Exhibit and loan of set of lantern slides.
Huyler Company	Cocoa and chocolate.
Seeman Brothers	Teas and coffees.
National Lead Co	Raw and refined linseed oils.
Parke, Davis & Company	Drugs.
The American Cotton Oil Co.	Cotton and products.
Armstrong Cork Co	Cork exhibit and set of slides.
Corn Products Refining Co	Corn and products.
McCutcheon & Co	Flax and products.
Philadelphia Bird Food Co	Seed.
Johnson & Johnson	Cotton bandaging, Red Cross cotton.
Benjamin Hammond	Slug shot and insecticides.
Peter Henderson	Vegetables.
J. L. Hopkins & Co	Crude drugs.
George Josephie Co	Broom corn.
Leggett & Co	Drugs.
Lehn & Fink	Drugs.
Merck & Co	Drugs.
McCormick & Co	Insecticidal flowers.
National Sugar Refining Co	Samples of sugar.
Peek & Velsor	Drugs.
Smith, Baker & Co	Tea seeds and samples.
Sugar Refining Co	Sugar.
W. & J. Sloane	Cocoanut fiber and rope.
Hawaiian Pineapple Packers	Photograph.
New York Produce Exchange	Grains.
Mr. F. C. Millett (Inspector-in-Chief, New York Cotton Exchange)	Samples of cotton in different stages.

Cryptogamic Herbarium

The following accessions of fungi, algae, mosses, and lichens were made during 1914:

Mosses and liverworts, by purchase	709
Algae, by purchase	2,125
Algae, by gift from Miss Lucinda Conklin, Huntington, L. I.	148
Lichens, by purchase	10
Fungi, by purchase	885
Fungi, by gift from Dr. F. D. Fromme, Purdue University	36
Fungi, by gift from Mr. Frank H. Ames, Brooklyn, N. Y.	43
Fungi, by collection	50
Total	4,006

Respectfully submitted,

Edgar W. Olive,
Curator of Public Instruction.

STATISTICAL REPORT ON THE LIBRARY FOR 1914

Prepared by Dr. Laura E. W. Benedict

Accessions, 1914

	Volumes	Pamphlets	Parts	Maps	Manuscripts
By purchase	493	649	94	2	0
By gift	880	918	314	7	5
By exchange	24	43	22	0	0
By publication	0	30	0	0	0
By transfer	6	12	15	0	0
Total	1,403	1,652	445	9	5

Grand total of publications added to the library in 1914, exclusive of current subscriptions, 3,514.

Total number of volumes in the library December 31, 1913	1,630
Volumes added in 1914	1,403
Total number of volumes in the library December 31, 1914	3,033

Current periodicals regularly received:—

By subscription	33
By gift	20
By exchange	55
By transfer from the Central Museum	4
By deposit	2
By publication	6
Total	120

Index cards of the United States Experiment Station Literature on file in the library December 31, 1913	5,693
Added by purchase in 1914	274
Total Experiment Station cards December 31, 1914	5,967
Torrey Botanical Club Index cards on file in the library December 31, 1913	18,566
Added by purchase in 1914	2,720
Total Torrey Botanical cards, December 31, 1914	21,286

Of this total number of accessions during 1914, the library acquires through the generous gift of Mrs. Annie Morrill Smith 792 volumes, 508 pamphlets, 276 parts, 5 manuscripts and 7 maps; the donation from Dr. Louis I. Dublin contains 39 volumes, 221 pamphlets and 6 parts; the publications secured by the purchase of the library of the late Mr. E. L. Morris include 260 volumes, 573 pamphlets and 83 parts; while our valuable purchase of a complete set of the Gardeners' Chronicle adds 100 quarto volumes to our files of bound periodicals.

FINANCIAL STATEMENTS FOR 1914

1. Municipal Account

1360 *Personal Service:*

Appropriation		$28,111.67
Contributed from private funds*		3,186.85
		31,298.52
Expended		31,298.52

1361 *Supplies:*

Appropriation		4,775.00
Transferred from 1364	$ .09	
Transferred from 1365	165.89	
Contributed from private funds	329.28	
Contributed from Park Dept. funds (Code No. 1306)	49.91	545.17
		5,320.17
Expended		5,320.17

* Exclusive of $532.25 paid for personal service in connection with the scientific collections, and regularly charged to private funds account.

1362 *Purchase of Equipment:*

Appropriation		2,225.00
Transferred from 1368	140.30	
Contributed from private funds	98.61	238.91
		2,463.91
Expended		2,463.91

1363 *Materials:*

Appropriation		400.00
Transferred from 1364	3.50	
Transferred from 1365	8.57	
Transferred from 1368	16.18	
Contributed from private funds	7.80	36.05
		436.05
Expended		436.05

1364 *General Repairs:*

Appropriation		500.00
Transferred to 1361	.09	
Transferred to 1363	3.50	
Transferred to 1369	1.95	5.54
		494.46
Contributed from private funds		71.64
		566.10
Expended		566.10

1365 *Light, Heat and Power:*

Appropriation		250.00
Transferred to 1361	165.89	
Transferred to 1363	8.57	174.46
		75.54
Expended		75.54

1366 *Hire of Horses and Vehicles with Drivers:*

Appropriation	45.00
Contributed from private funds	246.00
	291.00
Expended	291.00

1367	*Hire of Horses and Vehicles without Drivers:*		
	Appropriation		454.50
	Contributed from private funds		232.00
			686.50
	Expended		686.50
1368	*Expressage and Deliveries:*		
	Appropriation		375.00
	Transferred to 1362	140.30	
	Transferred to 1363	16.18	156.48
			218.52
	Expended		218.52
1369	*Communication:*		
	Appropriation		100.00
	Transferred from 1364	1.95	
	Transferred from 1370	2.75	4.70
			104.70
	Expended		104.70
1370	*Contingencies:*		
	Appropriation		350.00
	Transferred to 1369		2.75
			347.25
	Contributed from private funds		9.00
			356.25
	Expended		356.25
1371	*Insurance:*		
	Appropriation		50.00
	Expended		0.00
	Balance, December 31, 1914		50.00

Summary of Municipal Account:

Appropriated by city for maintenance		37,636.17
Contributed from private funds	4,181.18	
Contributed from Park Department funds	49.91	4,231.09
		41,867.26
Expended		41,817.26
Balance, December 31, 1914		50.00

2. Private Funds Accounts for 1914

1. Endowment Fund, Income Account:

Balance, January 1, 1914		$ 463.30
Income, 1914		2,500.00
Special contributions		6,250.00
		9,213.30
Expended		9,103.42
Balance, December 31, 1914		109.88

2. Botanic Garden Collections Fund:

Received, 1914		1,888.50
Expended		1,697.23
Balance, December 31, 1914		191.27

3. George C. Brackett Library Fund:

Balance, January 1, 1914		1.58
Income, 1914		25.00
		26.58
Expended		12.77
Balance, December 31, 1914		13.81

4. Incidental Account—Botanic Garden Office:

Balance, January 1, 1914		7.65
Received, 1914		40.33
		47.98
Expended	$ 16.48	
Transferred to Tuition Acct.	11.66	28.14
Balance, December 31, 1914		19.84

5. Tuition Account:

Received, 1914		212.83
Transferred from 6, Penny Packet Account		112.78
Transferred from 4, Incidental Account....		11.66
		337.27
Expended		337.27

6. Penny Seed-Packet Account:

Received, 1914		267.97
Transferred to 5, Tuition Account	$ 112.78	
Expended	155.19	267.97

7. Special Contribution—Japanese Garden Account:		
Received, 1914		10,065.00
Expended		10,050.94
Balance, December 31, 1914		14.06
8. Membership Fund:		
Balance, January 1, 1914		11.00
Received, 1914		12.00
		23.00
Expended		0.00
Balance, December 31, 1914		23.00
Summary of Private Funds Accounts:		
Balance, January 1, 1914		483.53
Income, 1914		21,261.63
		21,745.16
Expended		21,373.30
Balance, December 31, 1914		371.86

APPENDIX 1

APPROPRIATIONS OF CORPORATE STOCK OF THE CITY OF NEW YORK FOR PERMANENT IMPROVEMENTS, AND EXPENDITURES THEREFROM DURING 1914

C. D. P. 200J. For Grading, Draining, Piping, and Soil Improvements

Appropriation		$ 40,000.00
Expenditures:		
Connor Bros., contractors (1913)	$24.090.76	
Norton & Gorman Cont. Co	9,959.46	
Olmsted Bros., landscape architects	3,422.53	
Pay rolls	700.00	
Laying pipe	431.00	
Moving boulders	350.00	
Prints	3.60	38,957.35
Balance		1,042.65

C. D. P. 200K. For Construction of Roadways, Walks, Stone Steps, and Paving

Appropriation		$ 30,000.00
Expenditures:		
Di Menna & De Paola, contractors	$22,678.80	
Olmsted Bros., landscape architects	1,084.81	
Olmsted Bros., landscape architects	1,183.07	
Prints	41.32	24,988.00
Balance		$ 5,012.00

C. D. P. 200L. For Buildings

Appropriation, 1910		$100,000.00
Expenditures to January 1, 1914	$94,210.69	
Expenditures since January 1, 1914	0.00	94,210.69
Balance		$ 5,789.31

APPENDIX 2

RESOLUTIONS ADOPTED BY THE BOARD OF ESTIMATE AND APPORTIONMENT, ON FEBRUARY 26, 1915, APPROVING TRANSFERS OF FUNDS TO THE AMOUNT OF $389.14, APPROPRIATED IN THE TAX BUDGET OF THE BROOKLYN BOTANIC GARDEN FOR 1914

Department of Parks, Borough of Brooklyn—Transfer of Appropriation and Modification of Schedules (Cal. No. 34)

The Secretary presented a communication dated January 26, 1915, from the Commissioner of Parks, Borough of Brooklyn, requesting a transfer within the appropriation for said department for 1914; and the following report of the Comptroller recommending approval thereof and modification of schedules:

Department of Finance, City of New York, Bureau of Municipal Investigation and Statistics.

February 23, 1915.

To the Board of Estimate and Apportionment, the City of New York:

Gentlemen: On January 26, 1915, the Commissioner of Parks, Borough of Brooklyn, requested transfer of $389.14 within funds appropriated to the Botanical Garden and Arboretum for the year 1914.

The increases and decreases in the accounts affected by the proposed transfer are as follows:

FROM

1364	General repairs	$ 5.45
1365	Light, heat and power	174.46
1368	Expressage and deliveries	156.48
1370	Contingencies	2.75
1371	Insurance	50.00
		$389.14

TO

1361	Supplies	$215.89
1362	Purchase of equipment	140.30
1363	Materials	28.25
1369	Communication	4.70
		$389.14

The purpose of the transfer is to provide sufficient funds in the supply, equipment, material and communication accounts to meet certain bills regularly chargeable to those accounts. The bills exceed the balances available in the respective accounts to the amounts of the transfers requested, and cover expenditures necessary in connection with the work of the Botanic Garden for the year 1914.

There are sufficient balances available in the accounts from which transfer are proposed to permit of the transfer requested. Paragraph "*h*" of the budget resolution, however, prohibits the transfer to other accounts of funds appropriated for the payment of insurance. The balance of $50 in "Account No. 1371—Insurance," therefore, cannot be used for the purpose requested, and there is but $0.09 available in the accounts of the Botanical Garden and Arboretum, in addition to the sum herein proposed to be used. Consent, however, has been obtained from the Commissioner of Parks, Brooklyn, to the transfer of $49.91, to make the necessary provision, from "Account No. 1306—Building Material," appropriated to the Department of Parks, Borough of Brooklyn, in the 1914 budget.

The adoption of the attached resolutions approving the transfers and schedules as revised, is hereby recommended.

Respectfully,

WM. A. PRENDERGAST,

Comptroller.

The following resolution was offered:

Resolved, That the Board of Estimate and Apportionment, pursuant to the provisions of Section 237 of the Greater New York Charter, hereby approves transfer of funds appropriated to the Botanical Garden and Arboretum and Department of Parks, Brooklyn, for the year 1914, as follows:

FROM

Botanical Garden and Arboretum

1364	General repairs	$ 5.54
1365	Light, heat and power	174.46
1368	Expressage and deliveries	156.48
1370	Contingencies	2.75

Department of Parks, Brooklyn

1306	Building materials	49.91
		$389.14

TO

Botanical Garden and Arboretum

1361	Supplies, botanical and agricultural supplies	$215.89
1362	Purchase of equipment, general plant equipment	140.30
1363	Materials	28.25
1369	Communication	4.70
		$389.14

Which was adopted by the following vote:

Affirmative.—The Mayor, the Comptroller, the President of the Board of Aldermen, the Presidents of the Boroughs of Manhattan, Brooklyn and The Bronx, the Acting President of the Borough of Queens and the President of the Borough of Richmond—16.

The following resolution was offered:

Resolved, That the Board of Estimate and Apportionment hereby approves schedules, as revised, for the Botanical Garden and Arboretum and Department of Parks, Brooklyn, for the year 1914, as follows:

BOTANICAL GARDEN AND ARBORETUM

1361	Supplies—	
	Fuel supplies	$2,070.00
	Office supplies	1,000.00
	Botanical and agricultural supplies	1,715.89
	General plant supplies	205.00
	Total supplies	$4,990.89
1362	Purchase of equipment—	
	Office equipment	$ 150.00
	Wearing apparel	25.00
	General plant equipment	2,190.30
	Total purchase of equipment	$2,365.30

1363	Materials	$ 428.25

Contract or Open Order Service

1364	General repairs	$ 494.46

Contract or Open Order Service

1365	Light, heat and power	$ 75.54

Contract or Open Order Service

Transportation—

1368	Expressage and deliveries	$ 218.52

Contract or Open Order Service

1369	Communication	$ 104.70
1370	Contingencies	347.25

DEPARTMENT OF PARKS, BROOKLYN

Materials

1306	Building materials	$8,737.14

Which was adopted by the following vote:

Affirmative.—The Mayor, the Comptroller, the President of the Board of Aldermen, the Presidents of the Boroughs of Manhattan, Brooklyn and The Bronx, the Acting President of the Borough of Queens and the President of the Borough of Richmond—16. (*City Record* 43: 2109–2110. 12 Mch 1915.)

APPENDIX 3

MUNICIPAL ACTION ON APPROPRIATIONS FOR ADDITIONS TO THE LABORATORY BUILDING AND FOR TOP GRADING IN THE GARDEN

20 January, 1914. The Board of Estimate and Apportionment referred to the Committee on Corporate Stock Budget a communication from the Commissioner of Parks, Borough of Brooklyn, requesting the issue of $128,500 corporate stock for additions to the laboratory building, and $7,500 for top grading, and enclosed in support of said request a communication from the director of the Brooklyn Institute of Arts and Sciences. (*City Record* 42: 1598. 17 F 1914.)

No further action on this request has been reported during the year.

APPENDIX 4

RESOLUTION OF THE BOARD OF ESTIMATE AND APPORTIONMENT, PASSED APRIL 17, 1914, APPROVING THE FORM OF CONTRACT, ETC., FOR THE GRADING, TOP-SOILING, ETC., IN THE BROOKLYN BOTANIC GARDEN

The Secretary presented a communication from the Commissioner of Parks, Borough of Brooklyn, dated March 20, 1914, requesting approval of contract, specifications, etc., for excavating, filling in, grading, and top soiling the northeast corner and the southerly end of the esplanade in the Brooklyn Botanic Garden, also the following report of the Bureau of Contract Supervision recommending approval thereof:

CITY OF NEW YORK, BOARD OF ESTIMATE AND APPORTIONMENT, BUREAU OF CONTRACT SUPERVISION.

April 8, 1914.

TO THE BOARD OF ESTIMATE AND APPORTIONMENT:

Gentlemen: On March 20, 1914, the Commissioner of Parks, Borough of Brooklyn, requested approval of the forms of contract, plans, specifications and estimate of cost in the sum of $11,165.85 for excavating, filling, grading and top-soiling in the northwest corner, and at the southerly end of the esplanade in the Brooklyn Botanic Garden, Borough of Brooklyn, together with all work incidental thereto.

The cost is to be paid from a corporate stock fund of $40,000, approved by the Board of Estimate and Apportionment on July 17, 1911, concurred in by the Board of Aldermen on July 25, 1911, and entitled "C. D. P., 200J, Department of Parks, Boroughs of Brooklyn and Queens. Grading and Improvement of Botanic Garden and Arboretum." On March 31, 1914, an unencumbered balance of $12,779.06 remained in the fund.

The form of contract, plans and specifications are satisfactory.

The estimated cost of the work is considered excessive. Based on prices bid for similar work in the Botanic Garden during 1913, the cost should not exceed $10,000.

I recommend the adoption of the attached resolution which will approve the form of contract, plans, specifications and estimate of cost in the sum of $10,000.

Respectfully,

TILDEN ADAMSON,

Director.

The following resolution was offered:

Resolved, That the Board of Estimate and Apportionment, pursuant to its resolution of July 11, 1912, hereby approves the form of contract, plans, specifications and estimate of cost in the sum of ten thousand dollars ($10,000) for excavating, filling, grading and top-soiling in the northwest corner, and at the southerly end of the esplanade, in the Brooklyn Botanic Garden, Borough of Brooklyn, together with all other work incidental thereto, under the jurisdiction of the Department of Parks, Borough of Brooklyn, the cost to be paid from a Corporate Stock Fund entitled " C. D. P.–200J, Department of Parks, Boroughs of Brooklyn and Queens. Grading and Improvement of Botanic Garden and Arboretum," and further provided

If no bids are received for such work within such estimated cost the amount of such estimated cost upon the bids so received may be reconsidered in its discretion by the Board of Estimate and Apportionment provided that any of said bids is within the amount authorized or available for such work.

Which was adopted by the following vote:

Affirmative.—The Mayor, the Comptroller, the President of the Board of Aldermen and the Presidents of the Boroughs of Manhattan, Brooklyn, The Bronx, the Acting President of the Borough of Queens, and the President of the Borough of Richmond—16. (*City Record* **42**: 4053. 6 May 1914.)

APPENDIX 5

The abstract of proceedings of the Park Board, for the week ending April 4, 1914 (*City Record* **42**: 3228–3229. 9 Ap 1914) contains the following record of action taken on April 2, concerning the Brooklyn Botanic Garden:

"The agreement executed December 28th, 1909, between the City of New York by the Board of Estimate and Apportionment and the Brooklyn Institute of Arts and Sciences, was modified so as to take in an additional strip of land; and said modification was respectfully recommended to the Board of Estimate and Apportionment for adoption."

APPENDIX 6

PUBLICATIONS OF MEMBERS OF STAFF DURING 1914

Bisby, Guy R. Some observations on the formation of the capillitium and the development of *Physarella mirabilis* Peck and *Stemonitis fusca* Roth. American Jour. of Bot. **1**: 274–288. June, 1914. Brooklyn Bot. Gard. Contrib. No. 8.

—— The potato industry of northern Maine and its relation to that of Long Island. Brooklyn Bot. Gard. Leaflets, II.[11] 7 Oct. 1914.

Gager, C. Stuart. Botanic Garden. The Standard Cyclopedia of Horticulture. **1**: 526–532.

—— Gibson's Supplement to Jost's Plant Physiology. (Review) Torreya **14**: 109–110.

—— Vandalism turned to account. Brooklyn Bot. Gard. Leaflets. Ser. II, No. 7. July 17.

—— The need for additional endowment. Brooklyn Bot. Gard. Record **3**: 9–13. January.

—— Tree planting by Professor Engler. *Ibid.* 3: 13–17. January.

—— A new botanical journal. *Ibid.* 3: 17–18. January.

—— Third annual report of the Brooklyn Botanic Garden. *Ibid.* **3**: 27–52. April.

—— A rare book by Tradescant. *Ibid.* 3: 77–87. July.

—— Backyard gardening in Toledo, Ohio, and Lebanon, Pa. *Ibid.* 3: 87–89. July.

—— First annual high school day. *Ibid.* 3: 89–90. July.

—— Opening of the tropical economic house. *Ibid.* 3: 90–91. July.

—— The Japanese garden. *Ibid.* 3: 112–113. October.

—— and E. E. S[haw]. Tree Planting. Brooklyn Bot. Gard. Leaflets. Ser. II, No. 3. April 22.

Olive, Edgar W. Conferences for the better understanding of potato diseases and potato improvement. Brooklyn Bot. Gard. Record 3: 116–120. Oct. 1914.

—— Algae in the Garden brook. *Ibid.* 3: 120–123. Oct. 1914.

—— Doctorates conferred in botany by American Universities in 1914. *Ibid.* **3**: 123–126. Oct. 1914.

Shaw, Ellen Eddy. Four Editorials—The National Plant, Flower and Fruit Guild Mag. Nos. 1–4. Jan., March, June, Sept. 1914.

—— School Garden Associations—How to form and enjoy. Booklet for Boddington.

—— Bulbs for Small People. Booklet for Boddington.

—— Garden Magazine—Children's Garden Department. Jan.–July, Sept.–Dec. 1914.

—— Country-Life-in-America. Nature Club Editor and Monthly Calendar. Jan.–Dec. 1914.

—— Backyard gardens. Brooklyn Bot. Gard. Leaflets II: 1 April.

—— The wild flower garden. *Ibid.* II[2]. 8 April.

—— Children's garden exhibit. *Ibid.* II[6]. 3 June.

—— Window boxes. *Ibid.* II[10]. 30 September.

—— and C. S. G[ager]. Tree planting. *Ibid.* II[3]. 22 April.

Taylor, Norman. Wilson's Naturalist in Western China. Torreya **14**: 8–10. January (Review).

—— Index Kewensis. Torreya **14**: 37. February (Review).

—— Report of Curator of Plants. Brooklyn Bot. Gard. Record **3**: 52–57. April.

—— Schaffner's Field Manual of Trees. Torreya **14**: 110–111. June (Review).

—— The Salton Sea. Torreya **14**: 226, 227. November (Review).

—— Plants Collected on the South Georgia Expedition. Brooklyn Inst. Arts & Sci. Science Bull. **2**: 60–63. November.

White, Orland E. Studies of teratological phenomena in their relation to evolution and the problems of heredity. I. A study of certain floral abnormalities in *Nicotiana* and their bearing on theories of dominance. Amer. Journ. of Botany **1**: 23–26. Figs. 1–4. Ja 1914. Reissued as Contrib. from Bussey Institution and Brooklyn Bot. Garden Contrib. No. 7.

—— Abstract of above paper. Rept. Bot. Soc. of Amer., Science N.S. **39**: Feb. 1914.

—— A new cytological staining method. Science N.S. **39**: 394–396. Mch 1914.

—— Swingle on variation in F_1 citrus hybrids and the theory of zygotaxis. Amer. Naturalist **48**: 185–192. Mch 1914.
—— Self-sterility. (A review of the papers of Compton and Correns on the nature and inheritance of self-sterility). Bot. Gaz. **47**: 242–245. Mch 1914.
—— Heredity, variation and environment. Brooklyn Bot. Garden Leaflets II[8]: pp. 12. Figs. 1–5. Sept 1914.
—— The history of *Nicotiana* II. An account of the heredity and environment of a family of tobacco plants. *Ibid.* II[12]: pp. 12. Figs. 1–5. O 1914.
—— Grafts, grafting and graft-hybrids. *Ibid.* II[13 and 14]: pp. 12. Figs. 1–5. O 1914.

APPENDIX 7

PUBLIC LECTURES, ADDRESSES, AND PAPERS GIVEN BY MEMBERS OF STAFF DURING 1914

By the director of the Garden:

January 12. The work of the Brooklyn Botanic Garden. Men's Club, Church of the Evangel, Brooklyn.

January 20. The Brooklyn Botanic Garden and the City. Men's Club, Flatbush Congregational Club, Brooklyn.

January 26. The aim and work of the Brooklyn Botanic Garden. Brooklyn Woman's Club.

March 4. The botanic garden idea for American cities. National Arts Club, New York City.

April 30. The educational work of the Brooklyn Botanic Garden, National Plant, Flower, and Fruit Guild, American Museum of Natural History, New York.

May 5. Aspects of Nature. Mother's Club, P. S. 134, Brooklyn.

September 5. The life history of a tree. New York Botanical Garden.

October 15. A side path in education. Chiropean Club at the Pouch Galleries, Brooklyn.

November 2. Botanic gardens, past and present. Good Citizenship League, Flushing, L. I.

November 3. The Brooklyn Botanic Garden. Ladies Aid Society, St. Mark's M. E. Church, Flatbush.

November 10. The life story of a tree. Torrey Botanical Club, American Museum of Natural History, New York.

December 11. The study of botany. Associated High School Biology Clubs of New York City. At the Garden.

By the curator of plants:

February 24. Geology and the flora of Long Island. Brooklyn Institute of Arts and Sciences, Science Room.

March 13. Haiti and Santo Domingo. Patria Club, New York City.

March 16. The Hempstead plains. Brooklyn Institute of Arts and Sciences, Lecture Hall.

March 26. Notes on the local flora. Torrey Botanical Club, New York City.

May 15. Haiti and Santo Domingo. St. Mark's Parish House, Brooklyn.

October 12. Native plants and their cultivation. New Rochelle Garden Club, New Rochelle.

October 17. Flora of New York and vicinity. New York Botanical Garden, Bronx.

December 30. Growth forms of the flora of the vicinity of New York. Botanical Society of America, Philadelphia, Pa.

By the curator of public instruction:

January 20. Educational work of the Brooklyn Botanic Garden. Men's Club, Flatbush Congregational Church, Brooklyn.

January 21. Forestry. Before classes in biology from the Girls' High School. Central Museum, Brooklyn.

May 11. Plant diseases in comparison with animal and human diseases. Brooklyn Institute, Academy of Music.

May 18. Diseases of garden plants and trees. Brooklyn Institute, Academy of Music.

May 25. Rusts, smuts and other diseases of cereals. Brooklyn Institute, Academy of Music.

December 12. The nature of plant diseases. Brooklyn Institute of Arts and Sciences, Science Room.

By the assistant-curator of plant breeding:

February 25. The nature and inheritance of fasciation. Torrey Botanical Club, New York Botanical Garden.

March 18 and 25. Heredity, variation, and environment, with demonstration material. Pratt Institute Class, Brooklyn Botanic Garden.

By the instructor:

March 9. Agricultural opportunities of today. Agriculture Club, Ethical Culture High School, New York City.

March 19. Children's Gardens. New Paltz Normal School, New Paltz, N. Y.

April 1. What the Botanic Garden is doing for the children of Brooklyn. Mothers' Club, P. S. 139, Brooklyn.

April 2. Little gardens for kindergarten children. Mothers' Club, P. S. 8, Brooklyn.

April 3. Children's gardens. Mothers' Club at the Jewish Temple, Far Rockaway, L. I.

May 6. Arbor Day. Girls' High School, Brooklyn.

May 13. The city beautiful campaign. Teachers Association, Newburgh, N. Y.

May 15. The botanical side of nature work in public schools. Teachers' Association, Minneola, L. I.

June 14. School gardens. P. S. 144, Brooklyn.

October 7. Fall nature work. Berkeley Institute, Brooklyn.

October 23. What the Brooklyn Botanic Garden is doing for the children. Ethical Culture School, New York City.

October 27. How to plant bulbs. Kindergarten Department, Pratt Institute, Brooklyn.

October 30. Children's garden work. Boys and Girls Exposition, Windsor, Vermont.

November 12. Bulbs for home culture. Mothers' Club, P. S. 106, Brooklyn.

March 4–31. Eight talks to public elementary and high schools on Garden making.

April 3–30. Eight *ditto*.
May 8–11. Two *ditto*.
June 18. One *ditto*.

APPENDIX 8

AGREEMENT OF AUGUST 17, 1914, BETWEEN THE CITY OF NEW YORK AND THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES, AMENDING THE AGREEMENT OF SEPTEMBER 9, 1912, WHICH AMENDED THE AGREEMENT OF DECEMBER 28, 1909, TOUCHING THE BROOKLYN BOTANIC GARDEN*

BOARD OF ESTIMATE AND APPORTIONMENT, CITY OF NEW YORK

THIS AGREEMENT, made and concluded on the 17th day of August, in the year nineteen hundred and fourteen, between The City of New York, acting by its Board of Estimate and Apportionment, party of the first part, and the Brooklyn Institute of Arts and Sciences, acting by its Board of Trustees, part of the second part, witnesseth:

Original act and agreement

WHEREAS, The City of New York, acting by its Board of Estimate and Apportionment, party of the first part, and the Brooklyn Institute of Arts and Sciences, acting by its Board of Trustees, party of the second part, entered into an agreement on the 28th day of December, in the year 1909, for the establishment and maintenance of a botanic garden and arboretum on park lands in the Borough of Brooklyn, City of New York, and for the care of the same, in accordance with the terms and conditions as expressed in said agreement, and under authority granted to the said City of New York by chapter 509 of the Laws of 1897 and chapter 618 of the Laws of 1906; and

* This amendment was executed in triplicate, and one copy deposited with the secretary of the Board of Estimate and Apportionment, one with the Comptroller of the City of New York, and one with the treasurer of The Brooklyn Institute of Arts and Sciences.

Amendment of the act of 1897

WHEREAS, Said chapter 618 of the Laws of 1906 has been amended by chapter 178 of the Laws of 1911, entitled "An Act to amend chapter 509 of the Laws of 1897, entitled 'An Act to provide for the establishment of a botanic garden and arboretum on park lands in the City of Brooklyn, and for the care of the same,'" generally; and

First amendment of original agreement of 1909

WHEREAS, Said agreement, entered into on the 28th day of December, 1909, was amended on September 9, 1912, in pursuance of authority granted by said chapter 178 of the Laws of 1911; and

Provisions of the act of 1911

WHEREAS, Chapter 178 of the Laws of 1911 in section II, authorizes the Board of Estimate and Apportionment of The City of New York in its discretion on the recommendation of the Board of Commisioners of Public Parks of the said City, to enter into an agreement on behalf of said City with the Brooklyn Institute of Arts and Sciences for the establishing and maintaining by the said Institute of a botanic garden and arboretum upon such terms and conditions as may be agreed to, on "any of the lands lying between Washington avenue and Flatbush avenue acquired or that may hereafter be acquired by the City of New York and bounded northerly by the land formerly dividing the old City of Brooklyn from the late Town of Flatbush, easterly by Washington avenue and southerly and westerly by Flatbush avenue," as an addition to the land immediately adjacent and which is now maintained as a botanic garden and arboretum under the original agreement between the said City and the said Institute dated December 28, 1909, and

Recommendation for addition of new land. Boundaries thereof

WHEREAS, The said Board of Commissioners of Public Parks of the City of New York, on the 2d day of April, in the year 1914, passed the following resolution:

"*Resolved,* That, pursuant to chapter 178 of the Laws of 1911, and in consideration of the existing agreement between The City of New York and the Brooklyn Institute of Arts and Sciences for the establishment and maintenance of a botanic garden and arboretum on park lands in the Borough of Brooklyn, the Board of Commissioners of Public Parks of The City of New York hereby recommends to the Board of Estimate and Apportionment of the said City that the park lands bounded as follows: Beginning on the easterly side of Flatbush avenue at a point where the line formerly dividing the old City of Brooklyn from the late town of Flatbush intersects the said easterly side of Flatbush avenue and running in a northeasterly direction along the line formerly dividing the old City of Brooklyn from the late Town of Flatbush 746 feet 4 inches, more or less, to the westerly side of Washington avenue; thence in a southerly direction along the westerly side of Washington avenue 569 feet 11¾ inches, more or less, to the northwesterly side of the Brighton Beach railway lands; thence in a southwesterly direction along the northwesterly side of the Brighton Beach railway lands 545 feet 3⅜ inches, more or less, to the northerly line of Malbone street; thence westerly along the northerly side of Malbone street for a distance of 110 feet, more or less, to the easterly side of Flatbush avenue; thence in a northwesterly direction along the easterly side of Flatbush avenue 486 feet 1 inch, more or less, to the point of beginning, be added to the existing botanic garden and arboretum established under chapter 618 of the Laws of 1906, as amended by chapter 178 of the Laws of 1911, and maintained under an agreement between the said City of New York and the said Brooklyn Institute of Arts and Sciences, under the date of December 28, 1909, as amended by an agreement between the said City and the said Institute under date of September 9, 1912, this said area hereinbefore described and bounded, to be maintained and administered as a part of the said Brooklyn Botanic Garden and Arboretum under the same terms and conditions as now exist and are in force for the maintenance and administration of the said existing Brooklyn Botanic Garden and Arboretum, the said same terms and conditions as to cancellation and annulment by the party of the first part to apply to this additional tract of land described in this

resolution precisely as the terms and conditions of cancellation and annulment apply to the lands in the original botanic garden established in pursuance of the agreement entered into between The City of New York, party of the first part, and the said Brooklyn Institute of Arts and Sciences, party of the second part, dated the 28th of December, 1909; and subject to the following additional conditions, namely:

Provision for possible future roadway

1. "That the Board of Estimate and Apportionment of The City of New York, on the recommendation of the Board of Commissioners of Public Parks of said City, reserves the right to withdraw from the lands hereinbefore described in this resolution, a strip of land across the southerly part of said lands from Washington avenue toward the Willink Entrance of Prospect Park for the construction by the Department of Parks of a roadway thereon, the boundaries of said strip of land and the location of said roadway to be determined by said Board of Estimate and Apportionment on the recommendation of the said Board of Commissioners of Public Parks; and in laying out, grading and planting lands as hereinbefore described and bounded, due account shall be taken of the possible need of such roadway in the future."

Requirements concerning pathway for pedestrians

2. "The plans for the development and the use of these additional lands shall include a pathway for pedestrians running across the lands from Washington avenue to a point on Flatbush avenue near the Willink Entrance to Prospect Park and such pathway shall be kept open at such hours and times as shall be designated by the Park Commissioner of the Borough of Brooklyn, or by his successor or successors."

Agreement to second amendment

NOW, THEREFORE, in consideration of the actions already taken under chapter 618 of the Laws of 1906, and chapter 178 of the Laws of 1911, and in consideration of the mutual agreements herein contained, it is agreed by and between the said parties that the agreement between the said City of New York and the said Brooklyn Institute of Arts and Sciences, entered into on Decem-

ber 28, 1909, and amended by an agreement entered into on September 9, 1912, be hereby further amended as follows:

Second amendment. Grant of new land

That the party of the first part has granted and demised, and doth by these presents grant, demise and let unto the said party of the second part, the parcel of park lands as hereinbefore described and bounded in the resolution of said Board of Commissioners of Public Parks to be added to the lands of the Brooklyn Botanic Garden and Arboretum leased to the Brooklyn Institute of Arts and Sciences on December 28, 1909, and the additional lands leased to the said Institute on September 9, 1912, the said Institute, party of the second part, to have and to hold the same so long as the said party of the second part shall continue to carry out the objects and purposes defined in its Charter or in the amendments of said Charter except as herein or as in the aforesaid agreement of December 28, 1909, and the amendment thereto of September 9, 1912, otherwise provided, and shall maintain and administer this said parcel of land hereinbefore bounded and described for the purposes of a Botanic Garden and Arboretum as provided in chapter 178 of the Laws of 1911; and shall faithfully keep, perform and observe the covenants and conditions herein contained on its part to be kept, performed and observed until said lands shall be surrendered by the said party of the second part or its surrender is required by the party of the first part as provided in the original agreement dated December 28, 1909, in the amendment to the agreement dated September 9, 1912, and as further provided in this agreement; and the said parcel of land shall be used and held by the party of the second part under the same terms and conditions in all respects as the lands leased by the party of the first part to the said party of the second part on December 28, 1909, and as in the amendment dated September 9, 1912, with the following exceptions and conditions:

Right reserved to withdraw strip for roadway

1. "That the Board of Estimate and Apportionment of The City of New York, on the recommendation of the Board of Com-

missioners of Public Parks of said City, reserves the right to withdraw from the lands hereinbefore described in this resolution, a strip of land across the southerly part of said lands from Washington avenue towards the Willink Entrance of Prospect Park for the construction by the Department of Parks, of a roadway thereon, the boundaries of said strip of land and the location of said roadway to be determined by said Board of Estimate and Apportionment on the recommendation of the said Board of Commissioners of Public Parks; and in laying out, grading and planting lands as hereinbefore described and bounded, due account shall be taken of the possible need of such roadway in the future."

Construction of pathway specified

2. "The plans for the development and the use of these additional lands shall include a pathway for pedestrians running across the lands from Washington avenue to a point on Flatbush avenue near the Willink Entrance to Prospect Park, and such pathway shall be kept open at such hours and times as shall be designated by the Park Commissioner of the Borough of Brooklyn, or by his successor or successors."

Funds for permanent improvements and annual maintenance to be provided by the City

And the party of the first part herein agrees to provide such sum or sums of money as the Board of Estimate and Apportionment may deem necessary to cover the cost of necessary grading, soil additions and other permanent improvements, and also to cover the cost of the annual maintenance of the said lands in the same manner that it provides for other permanent improvements and for maintenance in the Botanic Garden and Arboretum heretofore established through the said agreement, dated December 28, 1909, and the amendment to said agreement, dated September 9, 1912, and in pursuance of the authority granted by said chapter 178 of the Laws of 1911.

Terms of cancellation and annulment

And it is hereby expressly agreed that this contract may be cancelled and annulled at any time by the party of the first part,

providing the Board of Estimate and Apportionment of the party of the first part, its successor or successors, after notice in writing to the party of the second part, served by mail or otherwise, notifying the party of the second part that some action is to be taken in reference to this agreement, by a vote of three-fourths of all its members, by motion or resolution, decide that it is for the best interests of the party of the first part that said contract be cancelled or annulled. And it is further agreed that upon said Board of Estimate and Apportionment aforesaid directing the cancellation or annulment of said contract, that the party of the first part shall serve upon the party of the second part, or its successor or successors, or any officer thereof, a notice in writing notifying the said party of the second part of the action of the said Board of Estimate and Apportionment, and the said party of the second part shall thereafter, and before the expiration of six months after the date of the service of said notice in writing, as aforesaid, notifying the party of the second part of the cancellation or annulment of the contract by the party of the first part, quit or surrender the said premises and remove all of its property therefrom except plants, trees and shrubs set in the soil and after such notice said party of the second part shall and will at or before the expiration of six months, quietly and absolutely yield up and surrender to the party of the first part, its successor or successors, all and singular the aforesaid demised premises, and upon the failure of the party of the second part to remove from said premises all its property and surrender and quit said premises as aforesaid, within six months after the service of notice as aforesaid, the said party of the first part shall have the right to enter in and upon said premises and take possession of same, together with all property of every kind, nature and description, remaining thereon.

Agreement to modify or annul

And it is further understood and agreed by and between the parties hereto that this agreement may be wholly cancelled or annulled, or from time to time be modified as may be mutually agreed in writing between said parties, or their successor or successors, anything herein contained to the contrary in anywise notwithstanding.

In witness whereof the party of the first part has caused this agreement to be executed by its Mayor, pursuant to a resolution of the Board of Estimate and Apportionment adopted at a meeting held on the 12th day of June in the year of our Lord nineteen hundred and fourteen, and the said party of the second part has caused the same to be executed by its President and Treasurer, and its official seal affixed thereto, pursuant to a resolution of the Board of Trustees of the Brooklyn Institute of Arts and Sciences adopted at a meeting held on the 12th day of June, in the year of our Lord nineteen hundred and fourteen.

CITY OF NEW YORK.

(Signed) GEORGE McANENY,
Acting Mayor.

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES,

(Signed) A. AUGUSTUS HEALEY,
President.

(Signed) DANIEL V. B. HEGEMAN,
Treasurer.

Approved as to form

(Signed) C. V. OLENDORF,
Acting Corporation Counsel.

The Brooklyn Institute of Arts and Sciences

Officers of the Board of Trustees

President—A. AUGUSTUS HEALY
First Vice-President—HON. CHARLES A. SCHIEREN*
Second Vice-President—COL. ROBERT B. WOODWARD
Third Vice-President—GEORGE D. PRATT
Treasurer—DANIEL V. B. HEGEMAN
Secretary—HERMAN STUTZER

Committee on Botanic Garden

ALFRED T. WHITE

WALTER H. CRITTENDEN	GEORGE D. PRATT
ALBERT DeSILVER	WILLIAM A. PUTNAM
GATES D. FAHNESTOCK	HERMAN STUTZER

Ex Officio Members of the Board

THE MAYOR OF THE CITY OF NEW YORK
THE PRESIDENT OF THE BOROUGH OF BROOKLYN
THE COMMISSIONER OF PARKS, BOROUGH OF BROOKLYN

* Deceased March 10, 1915.

PUBLICATIONS

OF THE

BROOKLYN BOTANIC GARDEN

RECORD. Established January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the annual report of the director and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden and of the Department of Botany of the Institute. To others one dollar a year; 25 cents a copy.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

1. *The educational work of botanic gardens.* 13 pages. 1911.

2. *The purpose of an introductory course in botany.* 8 pages. 1911.

3. *Cryptomeric inheritance in Onagra.* 11 pages, figs. 2; plates 2. 1911.

4. *On the origin and present distribution of the pine-barrens of New Jersey.* 15 pages, figs. 2. 1912.

5. *Ingrowing sprouts of Solanum tuberosum.* 10 pages, figs. 6; plate 1. 1912.

6. *Intermingling of perennial sporophytic and gametophytic generations in Puccinia, P. obtegens and Uromyces Glycyrrhizae.* 15 pages, 1 plate. 1913.

7. *Studies of teratological phenomena in their relation to evolution and the problems of heredity. 1. A study of certain floral abnormalities in Nicotiana, etc.* 14 pages, figs. 4. 1914.

8. *Some observations on the formation of the capillitium and the development of Physarella mirabilis Peck and Stemonitis fusca Roth.* 15 pages, 2 plates. 1914.

9. *The growth-forms of the flora of New York and vicinity.* 9 pages. 1915.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

1. *The Brooklyn Botanic Garden.* Price, 5 cents.

LEAFLETS. Established April 10, 1913, and published weekly or bi-weekly during April, May, June, September, and October. The purpose of the Leaflets is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Current numbers free to all who wish them. Back series complete, 50 cts. each; back numbers, 5 cts. each.

SEED LIST. Issued in December of each year.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in cooperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription rates: to members of the Botanical Society of America, $3.00 a year; to all others $4.00 a year.

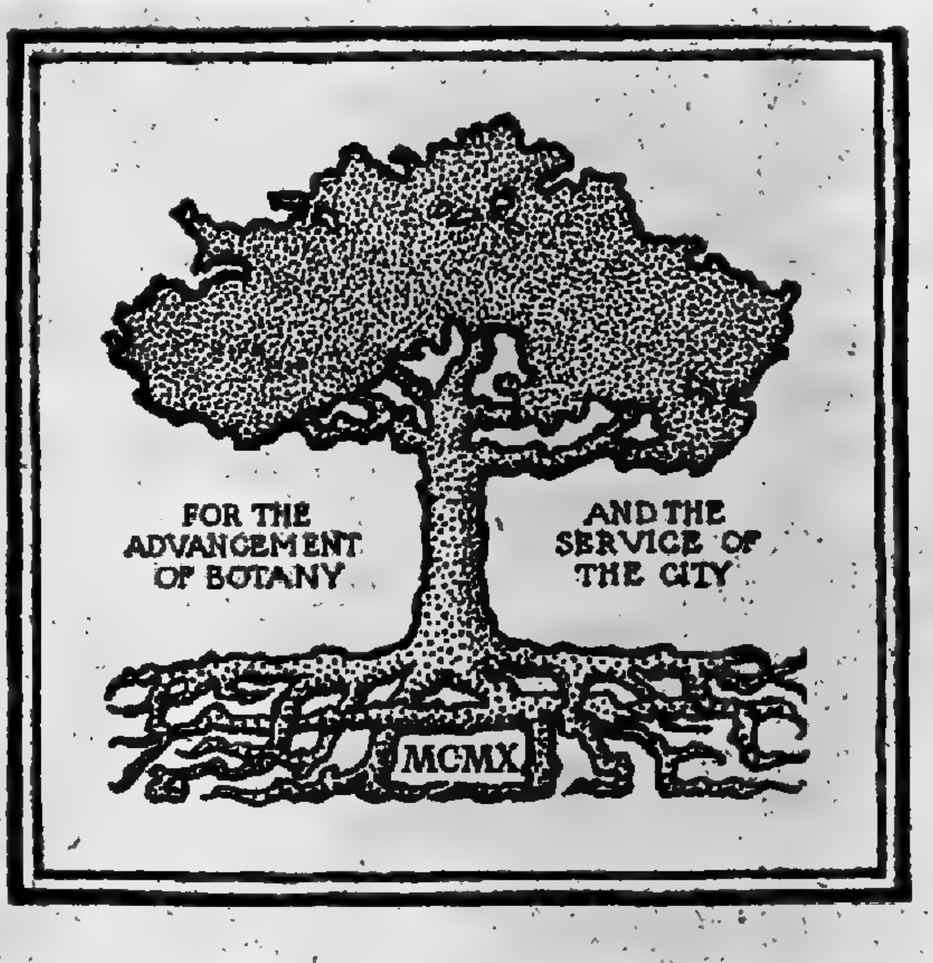
BROOKLYN BOTANIC GARDEN

RECORD

VOL. IV JULY, 1915 No. 3

EDITED BY

C. STUART GAGER



CONTENTS

PUBLISHED QUARTERLY
AT 41 NORTH QUEEN STREET
LANCASTER, PA.

BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

Entered as second-class matter in the Post-office at Lancaster, Pa.,
under Act of August 24, 1912.

BOTANIC GARDEN STAFF

DR. C. STUART GAGER, *Director*

MR. NORMAN TAYLOR, *Curator of Plants*

DR. EDGAR W. OLIVE, *Curator of Public Instruction*

DR. O. E. WHITE, *Assistant Curator of Plant Breeding*

MISS ELLEN EDDY SHAW, *Assistant Curator of Public Instruction*

MISS BERTHA M. EVES, *Secretary*

DR. LAURA E. WATSON BENEDICT, *Librarian*

MISS JEAN A. CROSS, *Instructor*

DR. WILLIAM MANSFIELD, *Honorary Curator of Economic Plants*

MR. HAROLD A. CAPARN, *Consulting Landscape Architect*

MR. MONTAGUE FREE, *Head Gardener*

_____, *Garden Aid*

_____, *Laboratory Assistant*

DR. ALFRED L. GUNDERSEN, *Herbarium Assistant*

MR. HERMAN KOLSH, *Foreman*

McKIM, MEAD & WHITE, *Architects*

OLMSTED BROS., *Landscape Architects*

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN

RECORD

VOL. IV July, 1915 No. 3

RARE CYCADS FROM AUSTRALIA

Through the courtesy of Mr. R. Simmons, Curator of the Botanic Gardens, Rockhampton, Queensland, Australia, the Brooklyn Botanic Garden was able, in March, 1914, to arrange for an expedition from the Rockhampton Gardens to collect native cycads for our collections. On March 12, 1914, instructions were forwarded to Mr. Simmons to collect as follows:

3 *Cycas media,* male,
3 *Cycas media,* female,
3 *Macrozamia spiralis,* male,
3 *Macrozamia spiralis,* female,
3 *Macrozamia Moorei,* male,
3 *Macrozamia Moorei,* female,
5 *Bowenia serrulata,* male,
5 *Bowenia serrulata,* female.

On receipt of the order the expedition was organized.

The cycads were collected on the ranges from six to ten miles from Rockhampton, the *Bowenia* at Byfield, 65 miles north from Rockhampton (with no railway connection), and the Macrozamias at Springsure, 206 miles west from Rockhampton, to which place trains run twice a week.

The collected plants, occupying seven large packing cases, as shown in figures 9 and 10, were shipped *via* London, on Wednesday, July 29, 1914, by S. S. *Argyllshire.* In addition to the plants ordered, Mr. Simmons courteously added 24 *Bowenia serrulata,* two extra *Macrozamia Moorei,* and one extra *Macrozamia "spiralis."*

The next information the Garden had of the plants was in a letter of October 3, 1914, from Mr. Simmons, which read as follows:

"Referring to the 7 cases of *Cycas, Macrozamia* and *Bowenia* plants shipped from this port per the S. S. *Argyllshire* on July 29 last, I have just had a letter from the agents there stating that the cases were landed at Sydney owing to the *Argyllshire* being

FIG. 9. Seven cases of Cycadaceous plants as they arrived from Australia, showing method of packing.

taken over by the federal government to convey troops from Australia to Europe, and that the cases have now been re-shipped into the S. S. *Suffolk*. I regret very much the circumstances which have caused the delay and sincerely trust that withal they may reach you in good condition."

No further information was received until February, 1915, when the following letter, dated January 29, 1915, was received from Messrs. McIlwraith, McEacharn & Co., London:

"*Dear Sir:* We were advised by our Rockhampton House, Messrs. Walter Reid & Co., Ltd., under date 14 August, that

they had forwarded 7 packages plants per S. S. *Argyllshire* to London, addressed to you, for transshipment from London to New York.

"We have to advise you that the S. S. *Argyllshire,* after being loaded, was taken over by His Majesty's government and the goods transferred to the S. S. *Suffolk.* This latter steamer was also commandeered by the government at Port Said, and the cargo transferred to the S. S. *Southern* which recently reached London.

"The bills of lading from Rockhampton to London per the S. S. *Argyllshire* consigned the goods as far as London only, but we notice from the bill of lading for the S. S. *Suffolk,* which was issued in place of the documents per S. S. *Argyllshire,* that the

FIG. 10. Cases of Cycadaceous plants from Australia, showing method of packing.

goods are to be transhipped at London and forwarded to New York at owners' risk but at ship's expense.

"We understand that the goods have now gone forward from London to New York per S. S. *Glenstrae,* and we enclose bill of lading issued for the S. S. *Suffolk* which, on presentation to the *New York Office of the Cunard Line,* will release the goods.

"We also inclose certificate of condition issued by the Australian commonwealth officer of the Department of Agriculture, which we think is required by the United States customs authorities.

"We trust the goods will be safely received despite the long transit and many handlings, and shall be glad to hear from you in due course to this effect."

The plants arrived at the Garden on February 16, 1915, six and one half months after shipment, and about seven months after collection. To our surprise and satisfaction, most of them appeared to be in good condition. The *Bowenia* has a stem best described as resembling an abnormally large turnip, while the stems of the *Cycas* and *Macrozamias* are thick and succulent, that of the *Macrozamia "spiralis"* being semi-tuberous. All the plants were, of course, devoid of foliage, and these facts, combined with the very careful manner in which they were packed, contributed to keep the plants alive during their seven months of transit and drought. Some of the seeds of the Macrozamias had germinated, but the seedlings did not live. It is probable, however, from present indications, that one or more specimens of each sex of all the four species will survive.

The cycads are closely related, botanically, to our cone-bearing trees, such as the spruce, pine, and hemlock, and probably are descended from the same common stock, which flourished untold years ago in the geological period known as the Mesozoic. Queensland is one of the greatest cycad centers in the world, the other being in the states of Oaxaca and Vera Cruz, Mexico.

The appearance of the *Cycas media,* as it reached the Garden, is shown in figure 11. The roots, emerging from the swollen base of the trunk had been pruned, and the removal of the foliage leaves left exposed at the top the seed-bearing leaves which are characteristic of the genus *Cycas.* One of these leaves, known to the botanist as a *megasporophyll,* or *carpel,* is shown, reduced from natural size, in figure 12. The plum-like "fruits" are not fruits at all, but naked seeds, developed from ovules not inclosed in an ovary.

The reader will recall that all the seeds with which we are

FIG. 11. *Cycas media.* Female plant with foliage leaves removed, showing crown of seed-bearing leaves, and roots. Accession No. 4238.

familiar in this country are enclosed in the tissues of the fruit, as in the case of the apple, the plum, or the watermelon. But in *Cycas* the seeds are not enclosed, and this feature has given the

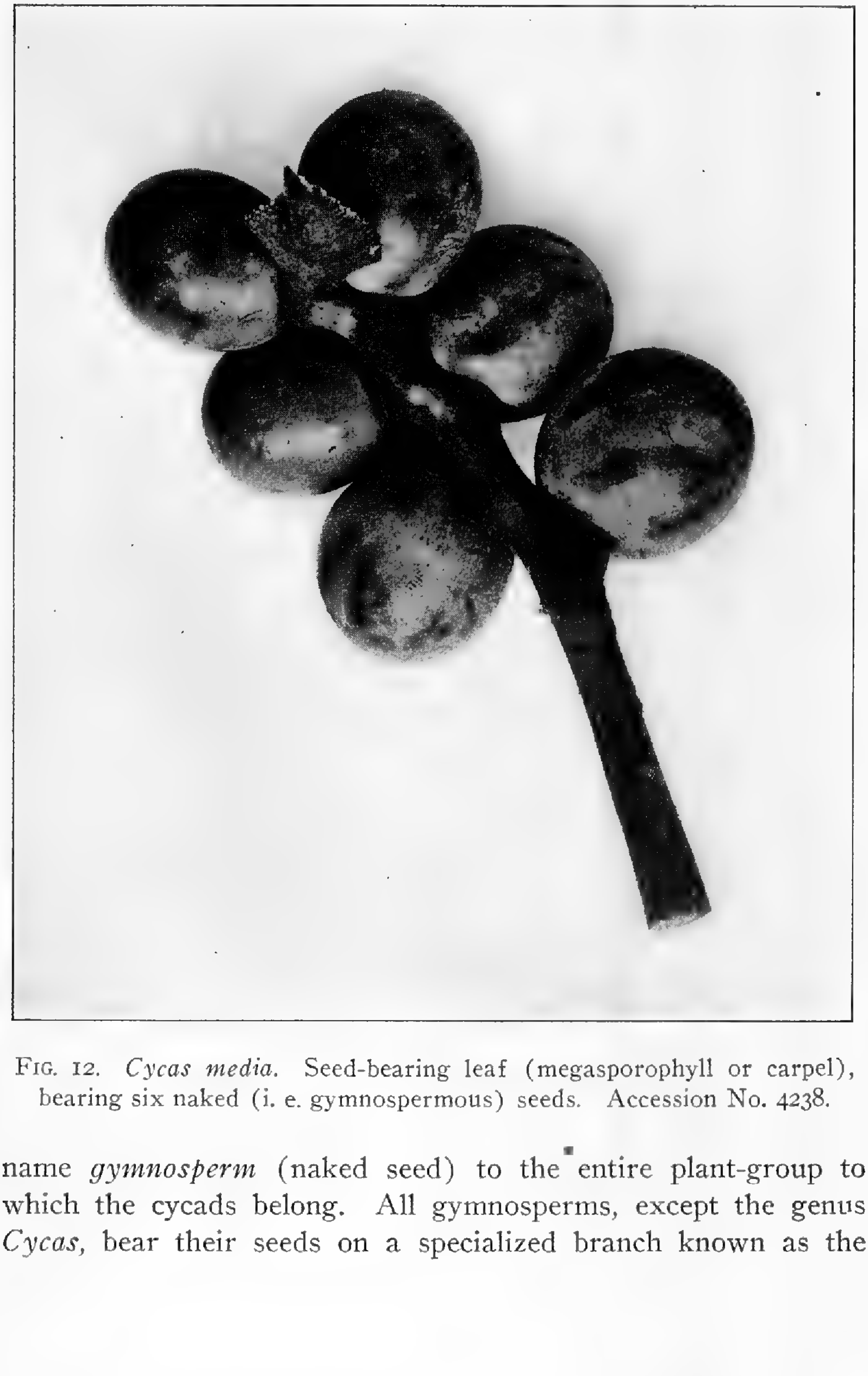


FIG. 12. *Cycas media.* Seed-bearing leaf (megasporophyll or carpel), bearing six naked (i. e. gymnospermous) seeds. Accession No. 4238.

name *gymnosperm* (naked seed) to the entire plant-group to which the cycads belong. All gymnosperms, except the genus *Cycas,* bear their seeds on a specialized branch known as the

cone, and in the other group of seed-bearing plants (the *Angiosperms*) there is always a "flower," but *Cycas* is unique, being the only known seed-bearing plant having neither a cone nor a flower (as that term is popularly understood), but bearing its seeds exposed on the edges of specialized leaves, or carpels.

By the removal of the sporophylls the terminal bud of the plant was exposed (fig. 13A). A photograph of a similar plant at a more advanced stage shows the crown of young foliage leaves which have developed from the terminal bud (fig. 13B).

In figure 14 is shown a photograph of the seed-bearing, or

FIG. 13. *Cycas media,* from Australia. A (at left) showing terminal bud after removal of spore-bearing and foliage leaves; B (at right) showing crown of young leaves. Accession No. 4238.

female, cone of the plant labeled *Macrozamia "spiralis."** In the older (though smaller) cone at the left the scales near the apex have spread apart, disclosing the seeds, two of which are borne on the under surface of each scale. Young and old pollen-

* When the plants come into foliage and fruit the determination of the species will be verified, as is the practice with all plants added to the scientific collections of the Garden. This plant is quite probably *M. Miquelii,* which closely resembles *M. spiralis.*

FIG. 14. Seed-bearing ("female") cones of *Macrozamia* sp., from Rockhampton, Australia. Accession No. 4238.

bearing, or male, cones of the same species, are shown in figure 15. The pollen-grains are borne on the under surface of the scales, in microsporangia or stamens.

The *Macrozamia Moorei* is, in some respects, the most interest-

FIG. 15. Pollen-bearing ("male") cones of *Macrozamia* sp., from Rockhampton, Australia. Accession No. 4238. Young cone at right, mature cone at left.

ing botanically of any of the plants, since, contrary to the usual custom in cycads, it bears its female cones laterally instead of at

the apex of the main stem. On account of this, and other features, it may be considered as a "connecting-link" between living and fossil cycads. Unfortunately the specimens of this species received by the Garden did not carry any cones.

The genus *Bowenia,* which also belongs to the cycad family (Cycadaceae), comprises only two known species, *B. spectabilis* and *B. serrulata,* both of which differ in several characters from all other cycads, but noticeably in having their leaves twice pinnately compound instead of pinnately compound. It has never been collected outside of Queensland, Australia.

The green, shiny leaves lose water very slowly, and are said to be able to withstand the direct heat of a tropical sun for several days after being removed from the plant, and supplied with no moisture. The cones are borne on upright branches that grow from the top of the underground main stem. Professor Chamberlain, who first described *B. serrulata* as a distinct species, records a case of an underground stem of *Bowenia* that lay under a well-beaten path leading to a house in Queensland, and then resumed activity, putting forth a crop of leaves after having been dormant for twenty years. It would not be surprising that a plant with such powers of drought-resistance might readily recover after a journey of only seven months without water.

All of these cycads are not only a valuable acquisition to our living collections from the botanical point of view, but will become objects of great beauty and popular interest.

C. S. G.

REORGANIZATION OF THE BROOKLYN INSTITUTE

One of the sources of strength of the Brooklyn Institute of Arts and Sciences is the fact that its development through more than half a century has represented a normal, healthy growth and expansion in harmony with the changing ideas and ideals of the times. Starting in 1823 as a free library for apprentices, it became, in 1843, the Brooklyn Institute, and organized a system of public lectures on various phases of science and art. Recovering from a period of financial stress, it was reorganized in

1888, and provision was made for the numerous "departments," under which the work of its present Department of Education is now conducted.

Under the guidance of Prof. Franklin W. Hooper, who was appointed Director in 1889, the activities of the Institute expanded, and its membership and influence increased until it became one of the most potent influences in the educational life of Brooklyn. By the death of Professor Hooper, in August, 1914, the Institute was deprived of the leadership of the one to whom, more than to any other, it is indebted for all it has been able to accomplish for popular education.

At the time of Professor Hooper's death the activities of the Institute had become organized about three clearly defined centers: the department of public lectures and concerts, under the immediate supervision of Professor Hooper, and the Museums, and the Botanic Garden, each under its own director.

In January, 1915, the board of trustees undertook the work of reorganizing the Institute along lines indicated by past experience, and by the status of organization which then existed *de facto*. This involved the abolition of the office of Director of the Institute, and the formal recognition of three coordinate departments, as referred to above, with three directors, independent each of the other, and reporting directly to a governing committee of the trustees.

The new constitution, embodying these features, was adopted on January 14, 1915. The Articles and Sections relating especially to the Botanic Garden are as follows:

"ARTICLE I

"*Objects*

"*Section 1.* The purposes of said corporation shall be the establishment and maintenance of Museums and Libraries of Arts and Sciences, the encouragement of the study of the Arts and Sciences and their application to the practical wants of man, the advancement of knowledge in science and art, and in general provision for popular instruction and enjoyment through its collections, libraries and lectures.

"The museums and libraries of said Corporation shall be open and free to the public and private schools of the City of New York at all reasonable times and open to the public on such terms of admission as shall be approved by the Mayor of the City and the Park Commissioner of the Borough of Brooklyn.

"ARTICLE II

"*Membership*

"*Section 1.* The membership of the Brooklyn Institute of Arts and Sciences shall comprise Benefactors, Patrons, Donors, Permanent Members, Life Members, Honorary Members, Fellows, Corresponding Members, Sustaining Members, Associate Members, Museum Members, and Botanic Garden Members.

"*Section 2.* The contribution or devise, according to the amount donated by him to the funds of the Institute in cash or securities, collections in art or science, or other property which shall be estimated by the Board of Trustees to be fully worth the sums named below, shall qualify the donor to be elected to one of the following classes of membership, viz.:

"BENEFACTOR, upon payment of $100,000 or over.

"PATRON, upon payment of $25,000, or over up to $100,000.

"DONOR, upon payment of $10,000, or over up to $25,000.

"PERMANENT MEMBER upon payment of $2,500. Permanent members shall be entitled to transfer their membership by will or other legal process.

"LIFE MEMBER, upon payment of $500.

"Any person being elected to one of the above classes of membership may, if he desire, have the option of designating a particular Department of the Institute under which he shall be enrolled.

"*Section 6.* SUSTAINING MEMBERS, who shall be entitled to all the privileges of Associate Members, Museum Members, and Botanic Garden Members, may also be elected by the Board of Trustees. There shall be no registration fee for Sustaining Members. Their Annual Dues shall be Twenty-five Dollars ($25) which shall be apportioned, as directed by the Trustees, among the three Departments of the Institute.

"*Section 9.* BOTANIC GARDEN MEMBERS may be elected by the Trustees on the recommendation of the Membership Committee. Their annual dues shall be Ten Dollars ($10) payable in advance, to be used exclusively for Botanic Garden purposes. They shall be entitled to admission to all receptions and lectures given at the Botanic Garden and to exhibits and openings preceding the admission of the public, and to all regular publications of the Botanic Garden.

"*Section 10.* The Benefactors, Patrons, Donors, Permanent Members and Life Members of the Institute shall also be known as the CORPORATE MEMBERS OF THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES, and shall in addition have all of the privileges of Sustaining Members. Each Corporate Member shall be entitled to vote in the election of Trustees of the Institute, and shall be eligible to election as a member of the Board of Trustees. The corporate powers of the Institute shall be vested in the Trustees. Fifteen Corporate Members shall constitute a quorum for the election of Trustees and transaction of other business.

"ARTICLE III

"*Management*

"*Section 8.* The work of the Institute shall be divided into three general Departments, namely: Department of Education, the Museums and the Botanic Garden. Each of these Departments shall be in charge of a Director appointed by the Board of Trustees and of a Governing Committee of not less than five, who with their Chairman shall be appointed from the Board of Trustees by the President. Each of said Directors shall have general charge and supervision of his Department, subject to the direction of the Governing Committee of that Department and of the Board of Trustees, and shall report to the Board and the Governing Committee of his Department, as often as required, concerning the work and needs of such Department.

"ARTICLE IV

"*Committees of the Corporation*

"*Section 1.* There shall be the following standing committees of the Board:

"1. General Committee.
"2. Governing Committee of the Department of Education.
"3. Governing Committee of the Museums.
"4. Governing Committee of the Botanic Garden.
"5. Finance Committee.
"6. Membership Committee.

"*Section 2.* The General Committee shall consist of the officers of the Board and the Chairmen and one member, appointed by the President, of each Governing Committee, and the Chairman of the Finance and Membership Committees. The President shall be Chairman and the Secretary shall be Secretary of the Committee. Said Committee shall, under the direction of the Board of Trustees, have the power, not specially delegated to the Governing Committees, to act upon all matters relating to the interests and management of the Corporation and upon such matters as may be referred to it by the Board or by any Committee. During the summer recess of the Board, the General Committee shall have authority, in such manner as the Board shall determine, to act on behalf of the Board of Trustees.

"*Section 5.* The Governing Committee of the Botanic Garden shall, under the direction of the Board of Trustees, have charge of the Botanic Garden, with general supervision of the grounds and buildings pertaining thereto. They shall have power to make all necessary repairs, and to regulate the use of the grounds, buildings and collections and in general have charge of all work relating to the Botanic Garden.

"*Section 6.* Each Governing Committee shall elect its own Secretary and shall report to the Board of Trustees at its regular meetings and at such other times as it shall be required. Each Governing Committee shall have the power to appoint such subcommittees as it may deem necessary, prescribing their duties. The chairmen of such subcommittees must be members of the Governing Committee.

"Each Governing Committee, subject to the direction of the Board of Trustees, shall make all contracts on behalf of the Board, relating to the work of its Department, shall audit all bills against the Institute relating thereto, and in general execute the

will of the Board in all matters pertaining to the work of its Department not otherwise especially delegated.

"*Section 7.* The Finance Committee shall, under the direction of the Board of Trustees, have charge of the collection, increase and investment of the endowment and permanent funds of the Institute, and shall have general charge of the financial interest of the corporation. It may also advise the Treasurer as to any necessary regulations for the work of the Treasurer's office, or the deposit or control of the current funds.

"*Section 8.* The Membership Committee shall, under the direction of the Board of Trustees, have charge of the admission of members and the general increase of the membership of the Institute in its various Departments."

THE GARDEN MEMBERSHIP

The new constitution of the Institute, in Article II, makes provision for a Botanic Garden membership.*

The Garden's canvass for members was inaugurated during the last half of April by the mailing of personal invitations. Each invitation was accompanied in the same mail by a copy of an illustrated book showing the progress in the development of the Garden, a booklet giving information as to its organization and work, a circular addressed to the parents and friends of children, and a card for reply. On the obverse of the reply card the classes of membership in the Garden were tabulated as follows:

CLASSES OF MEMBERS

1. Annual member	$ 10	4. Permanent member	$ 2,500
2. Sustaining member	25	5. Donor	10,000
3. Life member	500	6. Patron	25,000
		7. Benefactor	$100,000.

Information on the reverse of the card contained the following paragraphs:

"For the support of its scientific work, and its educational activities with children and adults, the Brooklyn Botanic Garden

* See page 94 of this issue of the RECORD.

is largely dependent upon private funds. For the extension of this work and its maintenance at a high standard of excellence our needs are greatly in excess of our resources. Receipts from membership dues are applied primarily to these phases of the Garden's activities.

"If you believe that the Botanic Garden is rendering a desirable and useful service to science, to education, and to society, you will be cordially welcomed to any of the classes of membership indicated on the reverse of this card."

The response to the invitations has been encouraging, especially in consideration of the fact that the country in general is now passing through one of the worst periods of industrial depression in its history, and is at present a field for more appeals to public spirit than ever before, on account of the suffering entailed by the European war, and the unfortunate financial situation. Up to June 15 there were enrolled three life members, ten sustaining members and fifty-eight annual members. There have also been enrolled twelve sustaining members, taken out through the Department of Education, and thus entitled to the membership privileges extended by the Garden and the Museum.

OPENING OF THE JAPANESE GARDEN

On Friday afternoon, May 7, from 4 until 6, the trustees and their friends, and the members of the Garden enjoyed a preliminary inspection of the new Japanese Garden, a gift to the city by the chairman of the committee on Botanic Garden. The day was cloudy, and toward the close somewhat foggy. This resulted in a slightly smaller attendance than would otherwise have been the case, but the character of the day rather added to the effectiveness of the view of the garden.

Tea was served in the tea house, Mrs. Alfred T. White, and Mrs. William A. Putnam pouring. Two Japanese women in native costume assisted in serving. The bronze storks, and the articles for the Inari shrine were on view for the first time, and two paths, one over the crest of the hill, west of the water-falls and temple, and the other around the north border of the lake, were open for the first time.

During the latter part of April and the first week in May much additional planting was done in the garden, including azaleas and other bushes, numerous trees, and German and Japanese *Iris* along the shore of the lake. Several honey-locusts and Scotch pines were planted north and west of the garden to serve as a screen between it and the large museum building.

On Saturday afternoon, June 5, from 3:30 until 6, about 550 members and friends enjoyed an inspection of the entire grounds, preliminary to their being thrown open to the public on the following day, after having been temporarily closed for a little over one year.

C. S. G.

APPOINTMENTS AND RESIGNATIONS

On April 17, Miss Alice I. Sabens resigned her position as stenographer to accept an appointment as teacher in charge of the school gardens, at New Rochelle, N. Y., installed for the first time this spring under the immediate direction of the local board of education.

The resignation of Mr. Guy S. Bisby, laboratory assistant, took effect on May 3, and on the following day Mr. Bisby left for Presque Isle, Maine, to accept, for the second season, the position of consulting plant pathologist with the American Potato Corporation, of Presque Isle, Maine. Mr. Bisby's duties will be, as heretofore, to seek to eradicate, as far as possible, plant diseases from the hundreds of acres of potato fields under his supervision. This work is under the direct control of officials of the United States Department of Agriculture, the new government laboratory for the study of potato disease being now located at Presque Isle. This method of the prevention of the spread of disease at the source of the seed has proved to be the most efficient method of handling certain serious diseases of potatoes.

Professor H. M. Fitzpatrick, of the department of plant pathology of the New York State College of Agriculture, at Ithaca, will join the Garden staff for the three months beginning June first. Professor Fitzpatrick, while at the Garden, will continue his work on various fungi and fungous diseases of plants.

An appointment as laboratory assistant has been accepted by Mr. Frank Stoll, to take effect on September 1.

With the growth of our scientific and educational activities, the work in the Garden offices has greatly increased until the appointment of an assistant secretary became necessary. The position was temporarily filled during May and June by Miss Lily C. Molloy, pending the appointment of Miss Barbara Eicholz, which will take effect on July 1.

NOTES

An unseasonable snow on April 3, accompanied by a temperature of 32° F., interrupted the out-of-doors work for nearly one week.

Professor H. H. Whetzel, head of the department of plant pathology in Cornell University, gave three illustrated lectures on "Diseases of Plants" before the department of Botany of the Brooklyn Institute of Arts and Sciences, on March 29, April 5, and April 12. Accompanied by the curator of public instruction of the Garden, Professor Whetzel took occasion during his two weeks' sojourn in Brooklyn to visit various plant growers at Flowerfield, Riverhead, Garden City, Jamaica, and other places on Long Island, in order to become better acquainted with the plant disease situation in this section of the state. The facilities of the Garden were placed at his disposal in his special studies on diseases of tulips and other bulbs, and on April 5 he addressed the Garden seminar on the subject of industrial cooperation in research.

On April 6, Miss Margaret Heatly, of the department of botany of Wellesley College, visited the Garden to inspect the laboratories. Plans are now being made for a new building for the biological sciences at Wellesley.

Miss Margaret Slosson, of the New York Botanical Garden, was at the Brooklyn Garden on March 3, consulting herbarium specimens of Porto Rican plants, especially ferns.

Dr. J. A. Samuels, of Amsterdam, Holland, was a caller on March 26, Prof. C. P. Burns, of the university of Vermont, on

June 10, and Dr. Daniel da Cruz, of the Catholic University of America, Washington, D. C., on June 24.

Professor E. C. Jeffrey, of the department of botany of Harvard University, gave an illustrated lecture on "The Formation of Coal," on April 19, before the Brooklyn Institute of Arts and Sciences, at the Academy of Music. Professor Jeffrey's remarkable discoveries concerning the composition of coal have been made by means of microscopic preparations, cut extremely thin by means of a microtome.

During May and June a new iron fence, uniform in style with the one enclosing the original area of the Garden, was erected by the Mott Iron Works. As a separate contract, entrance turnstiles, with provision for the admission of baby carriages, and exit gates planned to permit passage out (but not in) after the closing of the grounds, are being constructed for four of the gates. The entrance turnstiles have been especially devised by Mr. George M. Beerbower; chief engineer of the New York Zoological Park, so as to insure the registration of every entrance, and no more and no less, without the necessity of an attendant. It will not be possible to twirl the style and thus register several "entrances." The device for the admission of the baby carriages was also devised by Mr. Beerbower. The expense of the fence and entrances, amounting to approximately $2,500, was met by the chairman of the committee on Botanic Garden of the board of trustees.

The contract for the construction of walks on the south addition was awarded to the lowest bidder, Louis J. Sieling, 171 Madison Ave., New York. The total amount of the bid was $3,762. The walks are to be of the same type (penetration asphalt) as those constructed last season on the remainder of the grounds. Work began on May 11.

After prolonged discussion as to the most suitable tree for the two rows on each side of the esplanade approach to the Museum building, the choice fell on the flowering dogwood (*Cornus florida*). These trees, to the number of 156, were planted during April.

Over 200 ornamental trees and bushes, and Japanese and German *Iris* were planted in the Japanese garden in April.

A total of 324 students were registered in the various classes of instruction at the Garden in April, 283 in May, and 258 in June. During May, 78 class exercises and lectures were given, with an attendance of 2,052; during June, 19 classes with an attendance of 1136. Fifty-one parties were conducted through the Garden by the docent in June.

The attendance at the Garden on June 6, the first day of its being open to the public in over a year, was about 3,000. The total attendance for June was 10,000, the largest for any one month since the establishment of the Garden.

The April number of the *Plant World* announced two prizes, of $50 and $10 respectively, to be awarded for the best papers embodying original work in any phase of the water relations of plants. "The offering of these prizes is made possible by the generosity of Prof. B. E. Livingston and by contributions from Dr. D. T. MacDougal, Prof. J. J. Thornber, Dr. J. B. Overton, Dr. H. C. Cowles, Dr. W. A. Cannon, and Mrs. Edith B. Shreve. Competing papers should be written so as to give no internal evidence of authorship, and should be sent to the editor of the *Plant World* by December 1, 1915. The manuscripts will be submitted to a committee of seven judges, whose names will be announced later, and the award will be made public on March 1, 1916. The prizes will be withheld if it is the opinion of the judges that no paper has been submitted which is worthy of them. The second prize will be awarded at the discretion of the judges and may be added to the first prize if there is a wide hiatus between the merits of the two best papers. The *Plant World* reserves the right to publish any papers submitted in the contest, and in the case of such publication the author will be given an opportunity for the revision of his paper but not for any considerable extension of it."

The Brooklyn *Standard-Union,* for April 1, 1915, contains the following item:

"Nearly 150 pounds of seeds and several bushels of acorns from which at least half a million tree seedlings are expected, will be planted during the next two months in the arboretum of Letchworth Park, on the Genesee, in Wyoming County, the thousand-acre estate bequeathed to the people of the state by the late William Pryor Letchworth. The seeds include sixteen varieties of pine, half a dozen each of spruce, birch and ash, the mulberry, sweet gum, sour gum, larch, witchhazel, holly, juniper, American elm, slippery elm, button-ball, haw, yew, hickory, hackberry, maples, hemlocks, and others of the best known North American varieties, English walnuts, Japanese hemlock and gingko, and fourteen varieties of oaks."

The commencement address before the graduating class of the Glenwood Road School (P.S. No. 152), Brooklyn, was given by Miss Ellen Eddy Shaw, of the Garden staff, on June 29, 1915. It was this school that won the trophy for the best children's garden exhibit at the Botanic Garden last September.

A recent press bulletin issued by the New York State Forestry Association contains the following items:

"New York leads all the other states in the Union in lumber consumption, with a total annual bill for timber of all kinds of over $100,000,000. Enough wood is used annually in the industries of the State to make a board walk 1000 feet wide and one inch thick from Syracuse along the New York Central to New York City and part way back.

"In the United States as a whole four-fifths of the standing timber is privately owned, and one-fifth is owned by various States and the Federal Government. New York owns one-fifth of the forest land of the State and one fourth of the standing timber. Owing to a clause in the Constitution, this timber cannot be cut even though it is dying or dead and a menace to healthy timber about it. The State should allow careful cutting of mature timber in the Adirondacks.

"New York manufactures more pulp paper than any other State, consuming over 1,000,000 cords of wood per annum. Maine, its nearest competitor, is surpassed by over 100,000 cords.

"With over 6,000,000,000 bd. ft. of timber growing on the

forest land owned by the people of the State of New York, over $40,000,000 is sent out of the State each year for forest products. Proper use of the mature forests of the State and reforestation of land now idle would keep much of this vast sum in New York.

"Out of the 135,000,000 railroad ties used each year in the United States, New York supplies about 6 per cent. and consumes about 16,000,000."

Prof. Gentaro Yamada, of the Higher School of Agriculture and Forestry, Morioka, Japan, and Mr. Katudzi Uyemura, of the same institution, visited the Garden on July 3. They incidentally spoke in the highest praise of our Japanese garden. Returning from a trip around the world, in the course of which they have seen nearly every public Japanese garden outside of Japan, they unhesitatingly pronounced the one in the Brooklyn Botanic Garden as the most perfect they had seen, from the standpoint of Japanese landscape architecture.

On June 18, 1915, the Board of Estimate and Apportionment of New York City passed a resolution authorizing the issue of $100,000 corporate stock of the City of New York to provide means for permanent improvements at the Brooklyn Botanic Garden, including the completion of the laboratory building and plant houses. This action was taken following the generous offer of Mr. Alfred T. White, Chairman of the Botanic Garden Committee of the Brooklyn Institute trustees, to secure a like sum by private subscription. The amount was subscribed by Mr. White and the donors of the original endowment of the Garden. The appropriation will become available when approved by the Board of Aldermen and the Mayor. Plans are now being prepared for the completion of the buildings, only one-fifth of which are now erected, and it is hoped that ground may be broken this coming fall.

The Brooklyn Institute of Arts and Sciences

Officers of the Board of Trustees

President—A. AUGUSTUS HEALY
First Vice-President—COL. ROBERT B. WOODWARD
Second Vice-President—GEORGE D. PRATT
Third Vice-President—WALTER H. CRITTENDEN
Treasurer—DANIEL V. B. HEGEMAN
Secretary—HERMAN STUTZER

Committee on Botanic Garden

ALFRED T. WHITE

WALTER H. CRITTENDEN	GEORGE D. PRATT
ALBERT DeSILVER	WILLIAM A. PUTNAM
GATES D. FAHNESTOCK	HERMAN STUTZER

Ex Officio Members of the Board

THE MAYOR OF THE CITY OF NEW YORK
THE PRESIDENT OF THE BOROUGH OF BROOKLYN
THE COMMISSIONER OF PARKS, BOROUGH OF BROOKLYN

PUBLICATIONS

OF THE

BROOKLYN BOTANIC GARDEN

RECORD. Established January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the annual report of the director and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden and of the Department of Botany of the Institute. To others one dollar a year; 25 cents a copy.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

1. *The educational work of botanic gardens.* 13 pages. 1911.

2. *The purpose of an introductory course in botany.* 8 pages. 1911.

3. *Cryptomeric inheritance in Onagra.* 11 pages, figs. 2; plates 2. 1911.

4. *On the origin and prescnt distribution of the pine-barrens of New Jersey.* 15 pages, figs. 2. 1912.

5. *Ingrowing sprouts of Solanum tuberosum.* 10 pages, figs. 6; plate 1. 1912.

6. *Intermingling of perennial sporophytic and gametophytic generations in Puccinia, P. obtegens and Uromyces Glycyrrhizae.* 15 pages, 1 plate. 1913.

7. *Studies of teratological phenomena in their relation to evolution and the problems of heredity. I. A study of certain floral abnormalities in Nicotiana, etc.* 14 pages, figs. 4. 1914.

8. *Some observations on the formation of the capillitium and the development of Physarella mirabilis Peck and Stemonitis fusca Roth.* 15 pages, 2 plates. 1914.

9. *The growth-forms of the flora of New York and vicinity.* 9 pages. 1915.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

1. *The Brooklyn Botanic Garden.* Price, 5 cents.

LEAFLETS. Established April 10, 1913, and published weekly or biweekly during April, May, June, September, and October. The purpose of the Leaflets is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Current numbers free to all who wish them. Back series complete, 50 cts. each; back numbers, 5 cts. each.

SEED LIST. Issued in December of each year.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in cooperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription rates: to members of the Botanical Society of America, $3.00 a year; to all others $4.00 a year.

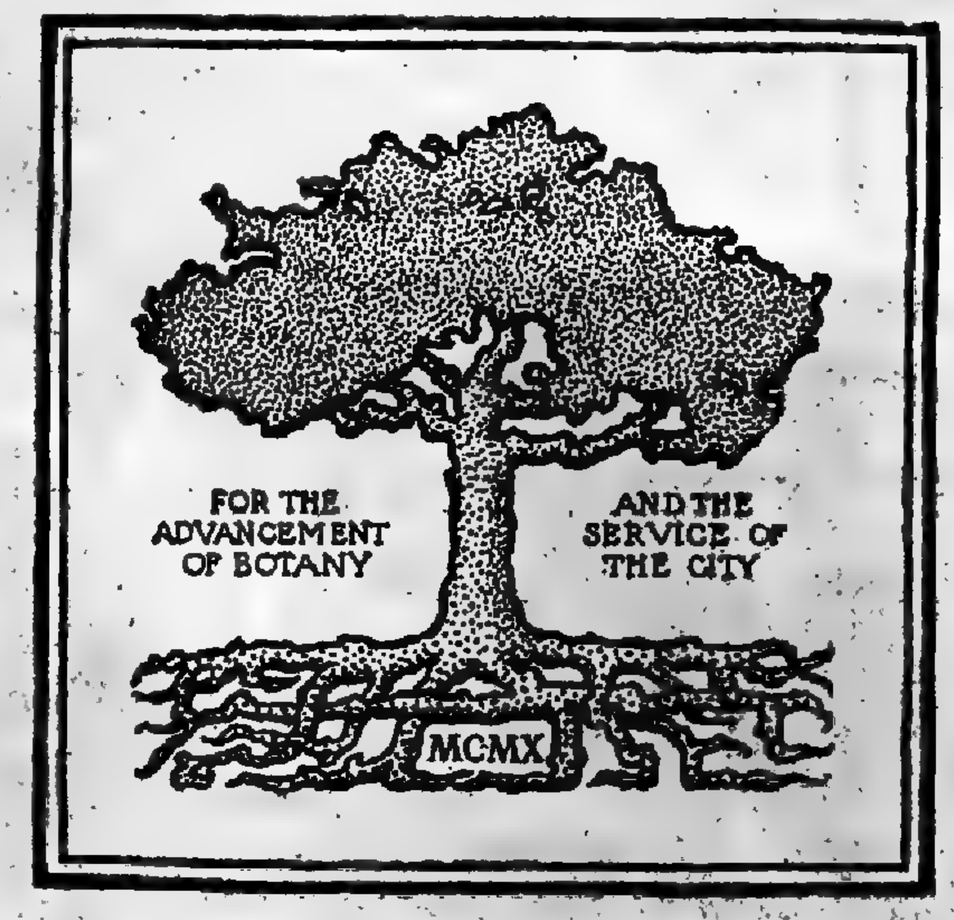
BROOKLYN BOTANIC GARDEN

RECORD

VOL. IV OCTOBER, 1915 No. 4

EDITED BY

C. STUART GAGER



CONTENTS

PUBLISHED QUARTERLY
AT 41 NORTH QUEEN STREET
LANCASTER, PA.

BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

Entered as second-class matter in the Post-office at Lancaster, Pa.,
under Act of August 24, 1912

BOTANIC GARDEN STAFF

DR. C. STUART GAGER, *Director*

MR. NORMAN TAYLOR, *Curator of Plants*

DR. EDGAR W. OLIVE, *Curator of Public Instruction*

DR. O. E. WHITE, *Assistant Curator of Plant Breeding*

MISS ELLEN EDDY SHAW, *Assistant Curator of Public Instruction*

MISS BERTHA M. EVES, *Secretary*

DR. LAURA E. WATSON BENEDICT, *Librarian*

MISS JEAN A. CROSS, *Instructor*

DR. WILLIAM MANSFIELD, *Honorary Curator of Economic Plants*

MR. HAROLD A. CAPARN, *Consulting Landscape Architect*

MR. MONTAGUE FREE, *Head Gardener*

DR. ALFRED L. GUNDERSEN, *Herbarium Assistant*

MR. FRANK STOLL, *Laboratory Assistant*

_____, *Garden Aid*

MR. HERMAN KOLSH, *Foreman*

McKIM, MEAD & WHITE, *Architects*

OLMSTED BROS., *Landscape Architects*

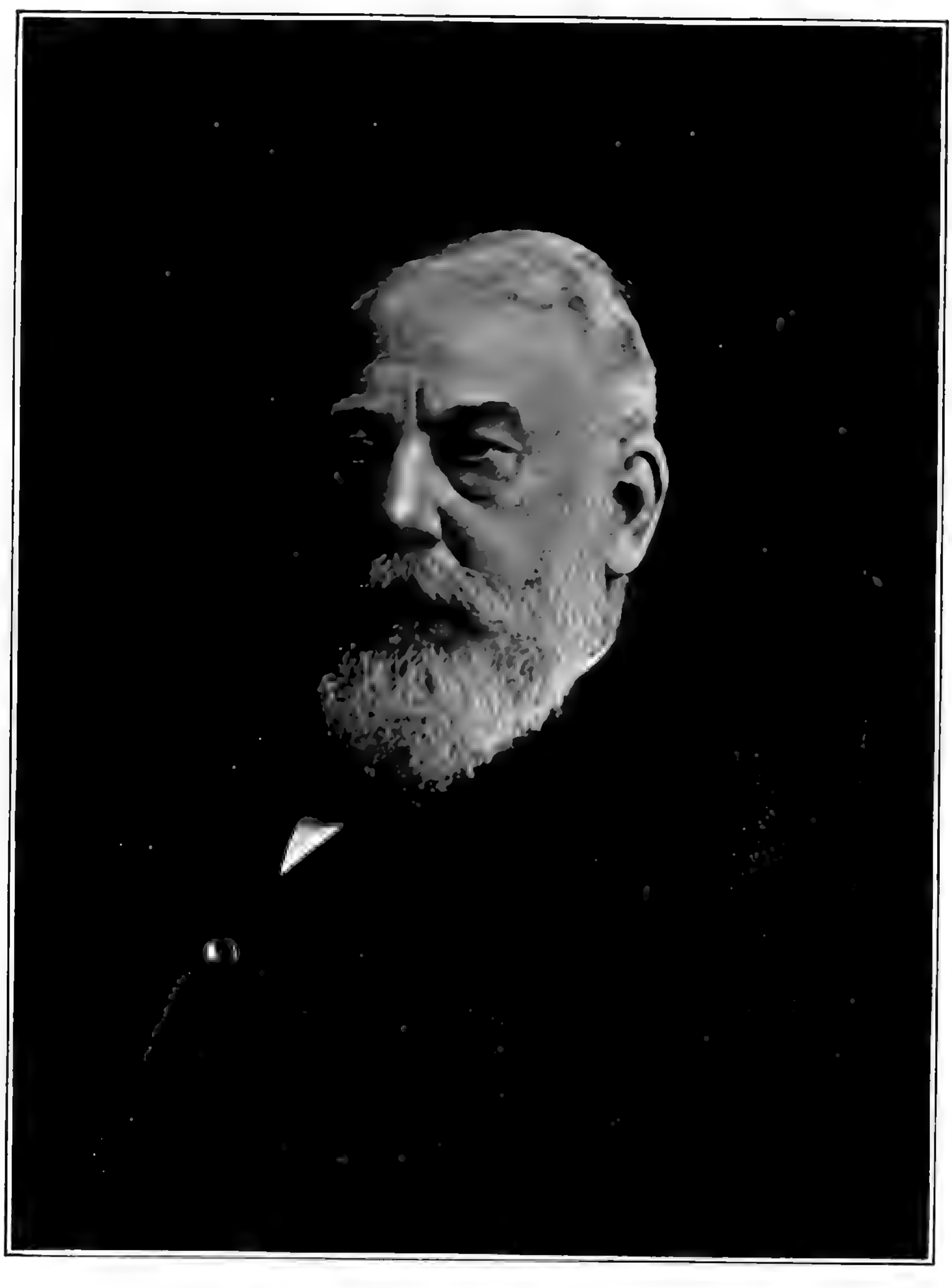


FIG. 16. Col. Robert B. Woodward. (After photo by Mr. A. E. Rueff.)

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN

RECORD

VOL. IV October, 1915 No. 4

THE BALLOT FOR NAMES FOR THE EXTERIOR OF THE LABORATORY BUILDING, BROOKLYN BOTANIC GARDEN

The erection at the Brooklyn Botanic Garden of a building, to be devoted entirely to botanical work, offers an excellent opportunity to give recognition to those whose devotion to the scientific study of plants laid the foundations of one of the most useful and important of modern sciences. Plans for the building, therefore, have been made to include two sets of tablets, one set on the frieze and one under the main windows of the building, bearing the names of the founders of botany.

The question at once arose as to how these names were to be chosen. Any botanist, of course, familiar with the literature and history of his science, could choose a list of names, great in his estimation and entitled to the proposed honor. Owing, however, to the high degree of specialization nowadays in all branches of science, few if any men would be likely to be thoroughly familiar with the work and comparative merit of those whose labors had been chiefly outside of their own immediate interests.

The most satisfactory plan that suggested itself was to have the names chosen by a vote of botanists of the United States. As a first step in carrying out this plan, a list of names of 113 botanists not now living was prepared and sent with a circular letter to twenty-eight contemporary botanists arbitrarily chosen, but with regard for geographical distribution and for securing

representation from all departments of the science. The list of names was made large enough to include nearly everyone whose work had entitled him to any considerable mention in existing works on the general history of botany, but not including local or regional histories. The circular letter and list of names to be voted on follows.

MARCH 10, 1911.

Dear Sir:—

The plans for the treatment of the exterior of the laboratory building soon to be erected in the Brooklyn Botanic Garden include the placing, in spaces provided for the purpose, of the names of botanists whose work would entitle them to such a distinction.

In order that the choice of these names may not represent a prejudiced or a too narrow range of opinion, it has been decided to seek from a number of botanists in the United States an expression as to what names are most worthy of a place. These botanists have been chosen with reference to geographical distribution and so as to include men of various special interests. Your cooperation is earnestly desired.

To this end, I am enclosing to you herewith a list of names of botanists, those now living not being included. There will be twenty-two (22) spaces under the frieze for those entitled to the greatest prominence, and three or four of these will be reserved for names of botanists now living.

The other names are to be placed under certain windows. There are forty-seven such windows and each of these spaces will probably contain three names, in smaller letters than those on the frieze.

The Director of the Brooklyn Botanic Garden will regard it as a highly esteemed favor if you will be willing to indicate on the enclosed list—

(1) By *one* check before the name, those names which you think are entitled to a place;

(2) By *two* checks, those entitled to one of the more prominent places;

(3) By *crossing out* those names which you think are not entitled to any place.

The suggestion of any names not included in the list, together with the place where they should go, will be heartily welcomed.

As an aid to memory, there is appended to most of the names in the list a brief phrase or other note indicating the man's work. Dates of birth and death are given in many cases.

It is desired to have represented as wide a range of the various subdivisions of the science as possible, such as physiology, morphology, anatomy, paleobotany, systematic, etc. A number of spaces under the windows will be reserved for names of botanists still living.

The individual marked lists will not be made public, though, unless there is objection thereto, it is possible that the names of those who re-

spond to this request may be published as a "Committee on Names" together with this letter and the list of names finally chosen for the building.

As prompt a reply as possible will be greatly appreciated, and for this purpose a stamped and addressed envelope is herewith enclosed.

With the hope that you will find time and inclination to render this service in the interests of botany, and with sincere thanks in advance, I beg to remain,

Yours very sincerely,
(Signed) C. STUART GAGER.

Preliminary List of Names to be Voted for

Cleidemus (quoted by Aristotle). Earliest plant pathologist.

Hippon (quoted by Aristotle). Taught that cultivated plants are derived from wild ones.

Aristotle. Established at Athens the first botanical garden of which we have record. Teacher of Theophrastus.

Dioscorides (cir. 64 A. D.). Medical botany. Phytography.

Theophrastus (B. C. 370–286). Improved the Athens Garden with financial aid from *Demetrius Phalerius*. Author of the oldest treatise on pure botany.

Ghini. First to use dried plants for scientific study. Teacher of Cesalpino.

Bauhin (1650). Distinguished species from genus, and described species.

Plinius secundus (A. D. 23–79). Wrote fifteen books on botany. Is credited by Adanson with being the first to distinguish growth buds from fruit buds in trees.

Brunfels (1464–1534). Reformation of Latin nomenclature. Early herbalist.

Fuchs (1501–1566). Economic botany. First attempt to establish a botanical terminology.

Trojus (1498–1554). First book of systematic plant description.

Ericius Cordus (1486–1535). First showed that the plants named by the ancient Greeks and Arabs do not grow in middle Europe and cannot be identified in the local flora.

Valerius Cordus (1515–1544). First named "pollen." First to establish *many* (more than one or two) new genera. First to observe and describe right and left hand mutation and twining. First to describe *sundew*. First to describe the occurrence of root tubercles (on garden lupine). Combated fallacy of the importance of the root. First to urge botanists to cease copying the descriptions of the ancients and to describe anew from nature.

Meyer (Ernest). "Historian of botany."

L'Ecluse. Director of Botanic Garden at Leyden, 1577.

Aldrovandi. Director of Botanic Garden at Bologna, 1567. First (with Cesalpino) to form herbarium. Pupil of Ghini.

Ratzenberger. Formed one of the first herbariums in the modern sense—1559(?) at Cassel.

Gesner (1516–1565). Emphasized importance of flower and fruit in determining affinities.

Cesalpino (1519–1603). "Created epoch of modern botany." First (with Aldrovandi) to form herbarium. Pupil of Ghini. Comparative morphology.

Jung (1587–1657). Invented comparative terminology for parts of plants. Interpreted compound leaf.

Morison (1620–1683). First to form a genealogical tree.

Ray (1628–1705). One of first to call attention to monocotyly and dicotyly and to endosperm in seeds. Accepted idea of a difference in sex in plants.

Bachmann (1652–1725). Urged the advantage of binomials.

Tournefort (1656–1708). First defined limits of genera.

Adanson (1727–1806). Separated families. Discovered movements of *Oscillatoriae*. Historian of botany.

Linnaeus (1707–1778). Father of modern systematic botany.

Bernard de Jussieu (1699–1776). Advanced the natural system.

A. L. de Jussieu (1748–1836). Assigned characters to families.

Gärtner (1732–1791). Spores different from seeds. Distinguished endosperm from cotyledons.

A. P. de Candolle (1778–1841). Distinguished between morphological and physiological marks.

Robert Brown (1773–1858). Discovered nucleus. Gymnospermy of Conifers and Cycads.

Endlicher (1804–1849). First to divide plants into Thallophytes and Cormophytes.

Lindley (1799–1865). Advanced systematic botany.

Schmidel (1718–1792). Sexual organs of liverworts.

Hedwig (1730–1799). Sexual organs of mosses. Founder of scientific knowledge of mosses.

Vaucher. Sexual reproduction of Spirogyra.

?Goethe. Metamorphosis.

?Leonardo da Vinci. Interpreted annual "rings" of growth of trees.

Nees von Esenbeck. First cultivated *Mucor stolonifer*.

Meyer (Ernst). Historian of botany.

Karl Adolph Agardh (1875–1859). Swedish systematist.

Jacob Georg Agardh (1813–0000). Swedish systematist.

Du Petit-Thouars (1758–1831). Director Botanic Garden at Roule.

Schimper (1808–1880). Spiral theory of phyllotaxy.

Braun (A). The shoot the morphological individual.

Carl Nägeli (1817–1891). Apical-cell. The cell the starting point of morphology. Cell formation and division. Gave name "primary meristem," and explained its significance. Starch grains. Growth by intussusception.

Bischoff (1797–1854). Marchantieae. Germination of vascular cryptogams. First saw spermatozoids of Chara.

Malpighi (1628–1694). Plant anatomy. First observed bordered pits. Gave first account of the development of the seed.

Grew (1628–1711). Coined term *parenchyma*. First saw stomata (on ferns).

Leeuwenhoek (1632–1723). Lenses. First to see crystals in plant cells (*e. g., Iris* and *Smilax*).

Wolff (1733–1794). Epigenesis.

Amici. Intercellular spaces contain air *vs.* sap. First to observe that pollen tubes enter the micropyle.

Comparetti. First observed opening and closing of stomata.

Bernhardi. Discovered annular vessels. The spiral threads are surrounded by a membrane.

Link (1767–1851). All thallophytes are plants, and the filaments of lichens and fungi consist of cells.

Treviranus (1779–1864). Discovered intercellular spaces in parenchyma. Discovered stomata on capsule of mosses.

Beninga (1815–1871). Advanced our knowledge of the structure of the moss-capsule.

Trentepohl. First observed escape and swarming of zoospores of *Vaucheria.*

Thuret (1853). Fertilization in *Fucus.*

Pringsheim. Sexual process in *Vaucheria,* etc. Alternation of generations in Muscineae. Conjugation of swarm spores in Volvoxineae.

Cohn. Sexual formation of spores in *Spaeroplea.*

Micheli (1679–1737). Director of Botanic Garden at Florence. Observed development of fungi from spores.

Ehrenberg. First described sexuality in a mould. (Conjugation in *Syzygites.*)

Schwendener. First declared true nature of Lichenes.

Hook (1635–1703). Improved microscope. Discovered cellular structure of plants.

Mirbel (1776–1854). Founder of vegetable histology in France. All plant tissue is modified parenchyma. Study of *Marchantia.*

Moldenhawer (1766–1827). First to employ maceration for separating vessels and woody cells, and established dual nature of the cell-wall between adjacent cells. Dispelled error that outer layers of wood are formed from the inner bast.

Meyen (1804–1840). Introduced terms prosenchyma, etc. Explorer; prolific writer.

Von Mohl (1805–1872). Cell formation. First described vegetative cell-division. Phytotomy. The cell the foundation of plant structure. Explained lenticels. Gave the name "protoplasm."

Payen (1795–1871). Walls of plant cells are of cellulose. Starch-studies. Discovered (with Persoz) diastase.

Schleiden (b. 1804). Cell-theory.

Unger (1800–1870). "Anatomie und Physiologie der Pflanzen."

Schacht (1824–1864). "Die Pflanzenzelle." Mode of formation of bordered pits.

Theodor Hartig. Discovered sieve-tubes.
DeBary. Fungi. Comparative anatomy.
Brongniart (1801–1876). Observed (1826) germination of pollen on stigma, and (1827) the formation of pollen grains in pollen mother cells.
Eichler. Morphology of the flower (1875–1878).
Payer. Morphology of the flower (1857).
Van Tieghem. Physiology.
Ward (Marshall). Dendrology.
Müller (Hermann). Pollination.
Müller (Fritz). Pollination.
Delpino. Pollination.
Hildebrand. Pollination.
Bentham. Systematic.
Hooker (W. J.) Systematic. First director of Kew Gardens.
Hooker (Sir J. D.) Systematic. Second director of Kew Gardens.
Renault. Fossil botany.
Solms-Laubach. Fossil botany.
Radlkofer. Systematic anatomy.
Solereder. Systematic anatomy.
Camerarius (1665–1721). Discovered sexuality in plants.
Gleditsch. Director Botanical Garden, Berlin. Experimental study of pollination and sex in plants.
Köllreuter (1733–1806). Director Botanic and Grand Ducal Garden in Carlsruhe from 1768–1786. First to investigate sexuality of plants scientifically. First to recognize importance of insects in pollination. First to produce hybrids.
Sprengel (1750–1816). Discovered dichogamy. Insects and pollination.
K. F. Gärtner (1772–1850). First intensive hybridizer of plants.
Van Helmont (1577–1644). Made first recorded experiment in plant physiology. Discovered that CO_2 turns lime-water milky.
Hales (1677–1761). "Vegetable Statiks." Laid foundation of plant physiology.
Du Hamel (1700–1781). "Physique des Arbres."
Ingen-House (1730–1799). Established the difference between photosynthesis and plant respiration.
Senebier (1742–1809). All plants composed of the same elements, but in different proportions.
de Saussure (1767–1845). Developed quantitative experimentation in plant physiology. Nitrates and mineral matter necessary to normal nutrition. Showed necessity of chlorophyll and light to photosynthesis, that carbon is combined with elements of water in the process, and that respiration is necessary to growth. Showed that the greater bulk of the dry substance of plants is derived from the air instead of from the soil. Plants do not obtain nitrogen from the air.
Winogradski. Chemosynthesis. Nitrifying organisms of the soil.
Traube. Cell growth. Osmosis.

Dutrochet (1776–1847). Compared respiration of plants and animals. First exact study of osmosis, and its importance for plant physiology. Tissue tension.
Beussingault. Experimental plant physiology. Showed that nitrates are most suitable form of nitrogen supply.
Knight (1758–1838). Geotropism.
Sachs. Historian of botany. Founder of modern plant physiology.
Frank. Plant pathology.
Gray, Asa. American systematist and teacher.
Darwin, Charles. Natural Selection. Plant Physiology.
Pasteur. Fermentation. Plant diseases.
Mendel, G. Heredity.
Huxley (1825–1895). Theory of Evolution.
Engelmann, Geo. (1809–1884). American systematist.

The following names have already been suggested for the frieze. Please indicate by crossing out or by adding such changes as seem to you appropriate

Aristotle	Darwin	Knight
Theophrastus	Sachs	von Mohl
Plinius Secundus	Gray	Sprengel
Dioscorides	Hofmeister	DeBary
Cesalpino	Ingen House	Pasteur
Linnaeus	Grew	de Sassure
Schleiden	Hales	Camerarius

Committee on Names

The "Committee on Names" was made up as follows: Arthur, Atkinson, Barnhart, Bessey (C. E.), Campbell, Bergen, Bray, Coulter (J. M.), Burgess, Curtis, Farlow, Ganong, Hollick, Holm, Jeffrey, Johnson, Lloyd, McDougal, Moore, Millspaugh, Mottier, Newcombe, Peirce, Schaffner, Ramaley, Spalding, Stevens (F. L.), Webber. Total, 28.

The following botanists who were asked to vote either declined or made no reply to the request: Britton, Brown (Stewardson), Clements, Cook (O. F.), Duggar, Evans, Galloway, Goodale, Greene (E. L.), Harper (R. A.), MacFarlane, Stevens (W. C.), Trelease.

Result of the Ballot

Table I gives the result of the ballot for names considered by the voters as worthy of one of the more prominent places, namely

on the frieze. No names are listed that received less than five votes. In addition to the names in the table, there were some 40 receiving from one to four votes.

TABLE I.

Result of Preliminary Ballot for Names to be Placed on the Frieze of the Laboratory Building of the Brooklyn Botanic Garden

Name	Pro	Con	Name	Pro	Con
Aristotle	26	2	Pasteur	25	3
Theophrastus	24	4	de Saussure	25	3
Plinius Secundus	17	10	Camerarius	16	12
Dioscorides	19	9			
Cesalpino	25	3	De Candolle, A. P	15	
Linnaeus	28	0	Nägeli	11	
Schleiden	23	5	Malpighi	12	
Darwin	27	1	Pringsheim	8	
Sachs	27	1	Brown (Robert)	11	
Gray	25	3	Hooker, Sir Joseph	12	
Hofmeister	24	4	Köllreuter	8	
Ingen-Housz	16	12	Mendel	9	
Grew	18	9	Ray	6	
Hales	23	5	Jussieu, A. L. de	6	
Knight	15	13	Hooker, W. J.	4	
Von Mohl	28	0	Brongniart	4	
Sprengel	21	7	Jussieu, Bernard de	2	
De Bary	25	3			

The first twenty-one names in Table I (above the line), *i. e.*, from Aristotle to Camerarius inclusive, were the ones mentioned in the preliminary list as having been already suggested as worthy of a place on the frieze. It is quite possible that this suggestion unconsciously influenced somewhat the vote.

Preliminary to a final vote the names in Table I were classified into five groups, as follows: (1) Systematists, (2) physiologists and ecologists, (3) anatomists and morphologists, (4) mycologists and plant pathologists, (5) paleobotanists. In some instances it was not easy to decide into which group a given name should be placed. This was the case especially with the men whose work was done in the years before intensive specialization. In such cases, the name was grouped on the basis of what was believed to be the man's major work, or more exactly the work which subsequent history indicated had exerted the greatest influence on the science. Here individual judgments would, of course, differ, but fortunately no voters interposed objections to any name included in the class for which they voted.

As a second step, a list was made of all botanists whose names are marked with an asterisk in the second edition of Cattell's "American Men of Science," and these names, according to their main interest as indicated in "American Men of Science," were arranged in five groups, corresponding to the five groups above mentioned. Systematists were then asked to cast the final vote for systematists, physiologists for physiologists, and so on.

The letters sent to the five groups of voters read alike, except for the third paragraph, as indicated below.

NOVEMBER 8, 1911.

Dear Sir:—

In March, 1911, a list of names of former botanists representing all departments of the science was sent to forty-two botanists of the United States. This list was prepared as a basis for a preliminary vote for names to be placed on the proposed laboratory building of the Brooklyn Botanic Garden.

There are twenty-two spaces (on the frieze) planned for names of greatest prominence, and the character and purposes of the Brooklyn Garden make it desirable that only five of the spaces to be filled at once be devoted to men whose contributions were chiefly in systematic botany. At least two of the twenty-two spaces will be left blank for the present.

1. One or more votes were received for each of forty *systematists,* but only thirteen names received five votes or more. I am sending a list of these thirteen names to *systematists only,* and inclose herewith a copy to you. The list of voters is confined to those whose subject of research is designated by a star in the second edition of "American Men of Science."

2. Two or more votes were received for each of ten *physiologists* and *ecologists.* I am sending a list of these ten names to only those whose primary interest is physiology or ecology, and enclose herewith a copy to you, etc.

3. Two or more votes were received for each of eight *plant anatomists* and *morphologists.* I am sending a list of those eight names to only those whose primary interest is plant anatomy or morphology, and herewith enclose a copy to you, etc.

4. Two or more votes were received for each of four *mycologists* and *plant pathologists.* I am sending a list of these four names to only those whose primary interest is in one or the other of these two closely allied departments of the science, and enclose a copy herewith to you, etc.

5. On the preliminary ballot Brongniart was the only *paleobotanist* to receive more than one vote. In order to get more nearly adequate returns for paleobotany, I am sending, to *paleobotanists only,* a list of names of men prominent in this department, and herewith enclose a list to you, etc.

Second Ballots for Names for the Brooklyn Botanic Garden

1. *Systematists.*

The following names of former systematists, arranged alphabetically, received, on a preliminary ballot, five or more votes for a place on the frieze of the proposed Laboratory Building of the Brooklyn Botanic Garden.

In order that opinion may be unprejudiced in this final ballot, the number of votes which each name originally received is not given.

Names.	
Aristotle Robert Brown De Candolle, A. P. Cesalpino Dioscorides Asa Gray Hooker, Sir Joseph D. de Jussieu Linnaeus Plinius Secundus Ray Theophrastus Tournefort	Cross out *eight* names.

My choice of five is indicated by those names *not* crossed out above.

(Signature) .....

Date.....

2. *Physiologists*

The following names of former plant physiologists and ecologists, arranged alphabetically, received on a preliminary ballot two or more votes for a place on the frieze of the proposed Laboratory Building of the Brooklyn Botanic Garden.

In order that opinion may be unprejudiced in this final ballot, the number of votes which each name originally received is not given.

Names	
Camararius Darwin Hales Ingen-Housz Knight Köllreuter Mendel Sachs Sprengel (C. M.) Saussure	Cross out *three* names.

3. *Anatomists*

The following names of former plant anatomists and morphologists, arranged alphabetically, received on a preliminary ballot, five or more votes for a place on the frieze of the proposed Laboratory Building of the Brooklyn Botanic Garden.

In order that opinion may be unprejudiced in this final ballot, the number of votes which each name originally received is not given.

Names	
Grew Hofmeister Malpighi Mohl Nägeli Pringsheim Schleiden Schwendener	Cross out *three* names.

4. *Mycologists*

The following names of former mycologists and plant pathologists, arranged alphabetically, received on a preliminary ballot two or more votes for a place on the frieze of the proposed Laboratory Building of the Brooklyn Botanic Garden.

In order that opinion may be unprejudiced in the final ballot, the number of votes which each name originally received is not given.

Names	
de Bary Cohn Fries Pasteur	Cross out *two* names.

5. *Paleobotanists*

The following names of paleobotanists, arranged alphabetically, have been suggested for places on the Laboratory Building of the Brooklyn Botanic Garden.

Please check twice (××) the one name judged worthy of a place on the frieze, and once (×) the names judged worthy of one of the minor places. Suggestions of additional names will be gladly received, but no names of those now living will be considered.

Names

Brongniart
Drude
Ettinghausen
Goeppert
Heer
Lesquereux
Michaux
Muhlenberg
Newberry
Rafinesque
Saporta
Schimper
Schlotheim
Sternberg
Unger
Williamson

The result of the second canvass gave the following

List of Names

Chosen by American Botanists for the Frieze of the Laboratory Building, Brookyn Botanic Garden

Systematic

Linnaeus
de Candolle
Asa Gray
Tournefort
Hooker, J. D.

Physiology and Ecology

Sachs
Darwin
Saussure
Mendel
Hales
Knight
Sprengel
Ingen-Housz

Anatomy and Morphology

Hofmeister
Mohl
Nägeli
Grew
Schleiden

Mycology and Pathology

de Bary
Fries

Paleobotany

Brongniart

The vote as above indicated provides for twenty-one of the twenty-two spaces on the frieze. The remaining space was assigned to Pasteur, who received twenty-five votes for a place on the frieze on the original ballot—as many votes as were received on the original ballot by Asa Gray, de Bary, and Saussure.

As the canvass of names of former botanists progressed, it gradually became evident that the number of really great ones has been much smaller than was at first anticipated. In fact, their number was so small that the placing of three names under each of forty-seven windows, in addition to twenty-two on the frieze, would have tended materially to diminish the honor con-

ferred. For this, and for other and minor reasons, it was finally decided to place only one name under each window.

By this plan, there remained 47 names to be chosen. The choices were made in three different ways, as follows:

1. Those names were taken which received one or more votes for a place on the frieze, but not enough for election to that place. These names, of which there are sixteen, are marked with an asterisk in the list below (Table II).

2. The five large windows of the central pavilion of the building, facing east, were set apart for American botanists, to be chosen by ballot.

TABLE II

Names Chosen for Window Tablets

1. Adanson
2. Amici
3. Aristotle*
4. Bauhin
5. Bentham
6. Boussingault
7. Brown, Robert*
8. Camerarius*
9. Cesalpino*
10. Cohn*
11. Cordus, Valerius
12. Delpino
13. Dioscorides*
14. Dutrochet
15. Elliott
16. Gärtner
17. Ghini
18. Hedwig
19. Heer
20. Hooke
21. Humboldt*
22. Jussieu, A. L.*
23. Kölreuter*
24. Link
25. Malpighi*
26. Micheli
27. Mirbel
28. Müller, Fritz
29. Pasteur*
30. Persoon
31. Pliny, II*
32. Pringsheim*
33. Ray*
34. Saporta
35. Schwendener*
36. Strasburger
37. Theophrastus*
38. Torrey
39. Ward, Marshall
40. Wolff

3. Of the remaining twenty-four names, twenty-two were chosen by the writer, partly from the original list, having regard to the number of votes received on the first ballot, and partly from the names voted for as American botanists, in addition to the five receiving the largest number of votes on that ballot. In all these cases the choice was not arbitrary, but was largely determined by expressions of opinion, in letters from voters, as to the relative merit of the various candidates.

* Received one or more votes for a place on the frieze.

In the case of Elliott, the choice was made on the double basis of nationality (American) and meritorious work. Strasburger has died since the votes were canvassed. His name was added to the list after consulting informally with a number of botanists, who were unanimous in the opinion that he was entitled to the honor both by his scientific contributions and the stimulus which he gave to contemporary investigation. There remains one window space to be filled.

The Vote for American Botanists

The result of the vote for American botanists will be of interest at least to all botanists of the United States. Since early American botanists were all chiefly interested in systematic, the committee was confined to those of like interest. The twelve men composing this committee were asked to name the five American botanists most worthy, in their opinion, of a place on the building. The names of this committee, and the canvas of votes are given in Table III.

TABLE III

Ballot for Names of American Botanists

Committee	Bartram	Chapman	Engelmann	Kalm	Michaux (Sr.)	Muhlenberg	Nuttall	Pursh	Rafinesque	Rudbeck	Schweinitz	Sullivant	Underwood	Walter	Wood	Elliott	Bigelow	Mohr	Schwartz	Oersted	Ellis
Barnhart	1		1				1		1		1			1							
Bessey, C. E.			1				1				1		1								
Britton*					1			1													
Coulter, J. M.			1		1		1	1	1												
Coville			1			1	1						1			1					
Fernald†			1		1		1	1								1	1				
Greene, E. L.			1				1	1	1								1				
Harper, Roland M.			1		1	1	1											1			
Robinson, B. L.					1		1	1						1		1					
Rydberg			1				1												1	1	1
Small‡																					
Trelease			1	1	1		1	1		1											
Total	1	0	9	1	6	2	10	6	3	1	2	0	2	2	0	3	2	1	1	1	1

* Voted erroneously for Torrey, Gray, and Lesquereux, none of whose names were on the ballot, since they were all chosen on the second vote.

† Voted for both André and F. André Michaux.

‡ Did not vote.

This ballot resulted in the choice of the following:

Names of American Botanists Chosen for Window Tablets

1. Nuttall
2. Englemann
3. Michaux
4. Pursh
5. Rafinesque

Some difficulty was experienced in making this choice, owing to the lack of a uniform interpretation of the adjective "American." One member of the committee, for example, voted for Sir W. J. Hooker, because of his work with American plants. It was intended, however, to designate, by the adjective "American," men who resided for a whole or a part of their lives in America and the major part of whose work was with the North American flora, and in most instances this was the interpretation given.

This canvass of votes raised a number of interesting questions and disclosed a number of significant facts. From the beginning, two considerations were kept in mind: first, that the building on which the names are to be placed is devoted to botany; second, that it is located in North America.

On the basis of the first consideration, it was deemed appropriate to include the names of a few men, who, while they would not primarily be classed as botanists, made important fundamental contributions to our knowledge of plant life, or established general biological principles that profoundly affected the subsequent history of the science. It is on this basis that the names of Darwin and Pasteur were included without hesitation, though many voters questioned the propriety of including Pasteur. His work on the disease of the grape, the disease of beer, and especially his epoch-making work in founding the science of bacteriology and establishing the relation between fermentation and plant life was as purely botanical as if done in a botanical laboratory. The name of Darwin was chosen arbitrarily by the writer as without question entitled to a place, and has been assigned a position on the frieze of the central section, corresponding to that of Linnaeus.

The name of Aristotle is included for two reasons; first, he

not only wrote several treatises on botany (long since lost), but he established (at Athens) the first real botanic garden of which we have any clear record; second, he was the teacher of Theophrastus, the director of that garden, author of the earliest known treatise on pure botany, and quite generally recognized by historians of the science as "the first of real botanists in point of time." Thus, while Aristotle could hardly, by any mental stretch, be called a botanist, his services to that science, as student, as teacher, and as generous patron, seem clearly to render the choice of his name almost a matter of course.

The above reference to Aristotle as the teacher of Theophrastus, suggest the fact, too often overlooked in our own day, that the discovery of new facts and the publication of papers do not constitute a man's only just claim to recognition or meritorious contribution to his science. The service of a stimulating teacher, inspiring others to scholarly effort, even though his own "contributions" and publications may approach the vanishing point, may do more for the advancement of the science than the discovery of a new chromosome, or of a species "new to science."

It was from such considerations as these that the name of Ghini was assigned a place. So far as we know, he never published anything, but about the middle of the sixteenth century students from all over Europe were flocking to him as the foremost teacher of botany in the world. He inspired Cesalpino, credited by Green as having "created the epoch of modern botany." Surely such service, if any, is entitled to recognition whenever honor is done to botanists of past ages.

It is from similar considerations that Schleiden's name is entitled to a place on the frieze, to which it was assigned by a large majority vote. "If," says Sachs, "we were to estimate Schleiden's merit only by the facts which he discovered, we should scarcely place him above the level of ordinarily good botanists; . . . the most important of the theories which he proposed . . . have long since been set aside . . . his great merit as a botanist is due not to what he did as an original investigator, but to the impulse he gave to investigation . . . he created, so to speak, for the first time an audience for scientific botany capable of distinguishing scientific work from frivolous dilettanteism."

Alexandre von Humboldt, while commonly thought of as a geographer, included in his encyclopedic interests the geography of plants, and must be regarded as among the founders of phytogeography; his contributions to the subject were scholarly and fundamental, and became a great stimulus to further work.

From the second consideration, namely, that the building is located in North America, some choices would obviously be different than they would be if the building were located in some other country. Other things being equal, any given choice would naturally fall to an American rather than to a European botanist. In fact, it may be a debatable question whether the choice ought not so to fall in some instances even if the "other things" were not strictly equal, but somewhat in favor of the foreigner.

On the other hand, in assigning scientific honors, it must always be kept in mind that science knows no country. Contributions to human knowledge, wherever made, belong to the entire world, and science is equally advanced by any given discovery, regardless of the country where it was made, or the nationality of the worker. This principle has been recently conspicuously recognized in the Nobel foundation. It is referred to here partly because the query has been raised in one or two quarters as to whether the list of names chosen for our buildings did not contain "a large number of foreigners for a botanic garden in America," or whether "American botanists were not conspicuous by their absence."

We believe it would be very unfortunate if such a view were to dominate in the selection of purely scientific honors. A building for the United States Naval Academy could not very appropriately be adorned with the names of naval heroes of other countries; but the Republic of Science is one, the world over. After all, it is botany and not one's country, for which botanic gardens are established.

However, of two men, one an American, the other a foreigner, whose services were quite as much to their country as to the science—such, for example, as describing the flora of hitherto little known regions, though contributing no new principle or fundamental fact—the choice of names should fall on the one in

whose country the honors are being conferred. Thus the name of Elliott has been chosen, although equally good and important work of a similar nature may have been done by other botanists in other countries.

It seems to have been very difficult to secure a completely detached vote, and one based upon opinions not distorted by foreshortening. Estimate of past achievement will always vary more or less with the particular department or line of work most prominent or fashionable at the time the vote is taken. Thus it is quite probable that Mendel, who received the fourth highest vote for a place on the frieze, would have received no vote at all, for any place, twenty years ago. To us, in 1914, it seems hardly probable that he would ever again fail of a majority.

A voter's estimate of past workers varies again with what is or has been his own main interest. For example, on our ballot for names a certain plant pathologist, interested chiefly in the physiological phases of plant diseases, relegated Cohn to a "minor place" because, as stated in his letter, he was "chiefly a systematist." Another voter, interested mainly in the morphology and taxonomy of the parasitic organisms causing plant diseases, suggested, not only that Cohn should have a place on the frieze, but that he was more entitled to it than Pasteur *because* he was "the more distinctly scientific worker and is equally famous for important achievement if we keep strictly within scientific lines." Two systematists suggested the elimination of Sachs and Hofmeister from the frieze, a vote that would cause almost any present-day morphologist or physiologist to gasp.

A decision of relative merits is greatly facilitated by considering what the effect on the advancement of the science would be if the work of either of two contributors had never been done. Thus, for example, one might compare the importance of De Candolle's discovery of the gymnospermy of Conifers and Cycads with any (indeed with all) taxonomic descriptions of these forms ever written.

Certain forms of scientific labor tend to lead the worker almost inevitably to place an exaggerated value upon the mere accumulation of new facts that may not point the way to fruitful hy-

potheses, or lead to the enunciation of any new principle. But science is most largely advanced by the thinkers in it, rather than the mere doers. Between the time of Linnaeus and that of A. P. De Candolle, botanists had so largely confined their labors to the mere accumulation of facts—to the description of "new or little known species," that botany, as Sachs has pointed out, had practically ceased to be a science. But the labors of De Candolle were those of the thinker. He established the theory and laws of the natural system on such a firm basis that his work marks the beginning of a new epoch in the science. To cite one more instance, men had described and accumulated the facts of teratology for centuries before a scientific thinker made such facts one of the corner stones of a fruitful mutation theory. It was, no doubt, in conscious or unconscious recognition of this principle of the scientific value of ideas over mere facts that no voter suggested the name of any of the numerous herbalists as entitled to even a minor place on the building.

In conclusion, may the writer suggest that the autograph originals of the ballots cast in the vote for names, preserved in the archives of the Brooklyn Botanic Garden, may possibly greatly rejoice the heart of some future historian of botany. The great historian of our science, Sachs, has declared that "The position of a scientific man in relation to his science as a whole is certainly most simply and clearly defined by his judgment on the merits of his contemporaries and predecessors." But the future historian may, let us hope, be able to allocate men to positions of relative greatness, independent of all personal opinion or prejudice, on the basis of the new exact science, which Dr. Woods has christened "historiometry."

It is a pleasure here to make public acknowledgement of indebtedness to those who have so kindly coöperated with the Brooklyn Botanic Garden in this choice of names; the courteous assistance thus rendered is most sincerely and gratefully appreciated.

C. Stuart Gager.

FIG. 17. Banana plant (*Musa esculenta*) in fruit, in the economic house, July 15, 1915.

SCHOOL GARDENING IN PHILADELPHIA

Invitations have been received for the fall exhibits of the school gardens, conducted by the board of education of Philadelphia, on September 13, 1915, and also for the home garden exhibits in public schools, on September 24. Thirteen large gardens and several smaller ones are conducted by the board, under the supervision of Caro Miller.

"The children's crops of vegetables and flowers may be seen in the individual plots. Sample crops of hemp, cotton, flax, tobacco, peanuts, broom corn and the like will be shown. Insect collections and raphia work made during the summer, as well as correlated work from the school room in language and drawing will be on exhibition.

"A sun dial has again been offered by Mr. C. S. Kates, Secretary of the Society for the Promotion of Agriculture, to be awarded to the best school garden. A committee will visit each garden on this day."

The home gardens exhibits will be installed in eighty public schools in various parts of the city.

"In the spring, over one hundred schools encouraged home gardening. Penny packets of seeds were secured, and simple instructions given to the children. The funds for the awards were given by individuals and interested clubs. Ten committees will cover the ten school districts, judging the exhibits on the following basis:

"1. For the school in each district with the largest percentage of enrolled pupils exhibiting their own garden products. First Prize—Pennant, 'Gardening for Philadelphia—1915.' Second, Third and Fourth Prizes—Ribbons.

"2. For the school with best exhibit, judged by quantity, quality, arrangement and management of exhibit: First, Second and Third Prizes—Choice of 2 Weigelias, 3 Boston Ivy Plants, 1 self-watering window box.

"Local Committees at each school will award the following:

"1. To the boy and girl in each home garden district who has worked hardest to overcome obstacles. (To be chosen by home garden teacher.) First Prize—Climbing Rose—Dorothy Perkins. Second Prize—Picture.

"2. To boy and girl having best box garden. First Prize—One dozen Narcissus. Second Prize—Picture.

"3. For six best cut flowers grown in home garden and exhibited in school. Prizes—Climbing Rose, Garden Hoe and Picture.

"4. Best exhibit of one kind of vegetable. Prizes—Two Grape Vines and Picture.

"5. Best exhibit of 3 or more kinds of vegetables. Prizes—Two Raspberry Bushes and Picture.

"Winners in the Achievement Club projects in tomatoes, potatoes, corn and poultry will be awarded the standard bronze, silver and gold buttons used in the National Girls' and Boys' Clubs of the United States Department of Agriculture."

School gardens, as stated in the invitation, were organized in 1904, and at present employ 14 trained school garden teachers and assistants, 15 home garden teachers, 7 gardeners (laborers), and one supervisor. The season extends from April 1 to November 1, and the average size of the larger gardens is one third of an acre, with individual plots for each pupil of 8 × 10 feet. These gardens are all situated in or near the school yard.

Individual plot holders come from the fifth grade, with attendance three times a week, at 3 o'clock. Twenty mentally deficient, disciplinary, and open-air classes have garden facilities, in addition to the work with regular classes. Twenty-four schools in the city have ornamental gardens, cared for by the pupils during school time, and kindergarten classes have garden opportunities in 32 schools.

The fifteen home garden teachers have supervised home gardens of 13,000 children during 1915, the visits averaging three per child per season. This work now reaches about one tenth of the public school children of Philadelphia, and the aim is: "Gardening for every child in every school and home."

C. S. G.

NOTES

By the will of Col. Robert B. Woodward, who died on September 2, 1915, the Garden received a bequest of $25,000 to be added to the endowment fund, the income to be used, without restriction, as the trustees may from time to time designate.

The plans and specifications for the completion of the laboratory building and plant houses of the Garden were approved by the Department of Parks during the first week in September, and were forwarded to the Board of Estimate and Apportionment, for its approval, on September 3. The estimated total cost of the work is $177,500. It is hoped that the foundations may be completed before hard freezing begins this fall.

The second annual children's garden exhibit of the Garden was held in the laboratory building and plant houses on September 24–25. Nearly two thousand children, of 15 years of age or younger, exhibited flowers and vegetables raised by them in their school or home gardens during the past season. This is about four times as many as exhibited at the first exhibit, held last year. The committee of awards consisted of Mr. John Lewis Childs (chairman), Miss Hilda Loins, and Mr. Montague Free. Twenty-two schools competed for the trophy awarded annually to the school making the best exhibit. The trophy, a bronze statue of Victory, was won for the second time by P. S. 152. Second prizes were awarded to P. S. 43, and P. S. 98, and honorable mention to public schools 129, 92, 89, 153, 115, and 26. The attendance at the exhibit was 2287.

At the exhibition and exercises, marking the close of the first season of the school gardens of New Rochelle, on Friday, September 17, 1915, the principal address was given by Miss Shaw, of the Botanic Garden Staff. The New Rochelle gardens were organized and conducted for their first season by Miss Alice I. Sabens, a graduate of the Botanic Garden course for the preparation of teachers of children's gardens.

During the week, September 6 to 11, 1915, exercises were held in celebration of the twentieth anniversary of the establishment of the New York Botanical Garden. Registration, addresses of welcome, and a dinner occupied the first day. Sessions for the reading of papers were held in the morning and afternoon of Tuesday and Thursday, field trips were taken on Wednesday to Great Kills, Staten Island (salt water day), and on Friday to the pine barrens of New Jersey. On Saturday, the eleventh, the guests, to the number of 50, visited the Brooklyn Garden and Long Island. The forenoon was occupied with an inspection of the buildings and grounds. Luncheon were served in the laboratory building at noon, and the afternoon was devoted to a trip to the cedar swamp (*Chamaecyparis thyoides*), near Merrick, L. I. The large number of papers offered for the scientific programs,

especially considering the close proximity of the coming annual meeting of the Botanical Society of America during Christmas week, is a very encouraging indication of the amount of botanical investigation now in progress in America.

The director of the Garden visited the botanic garden and the new botanical building at Smith College, in company with the curator of public instruction, on June 18, and again on June 28, in company with Mr. H. W. Martin, representing McKim, Mead & White, the architects of our building, and Prof. R. A. Harper, Torrey professor of botany in Columbia University. Accompanied by Mr. Alfred T. White, Professor Harper and the director went by auto car from Northampton to inspect the botanic garden at Mt. Holyoke College, So. Hadley, Mass., and the Massachusetts Agricultural College at Amherst. At the latter institution cuttings were obtained of the silver leaf vine (*Actinidia polygama*), from the specimen growing at Amherst, and introduced by the director of the Station, Dr. William P. Brooks. The original plant was collected by Dr. Brooks in Japan, several years ago.

The difficulty of collecting seeds for our exchange list has been materially increased this season by the excessive rains, which have caused many species to decay or die before setting seed. On the other hand, the moisture has been very favorable for the fruiting of many native wild flowers. Abundant seeds have been collected in the woods with comparative ease from such well-known favorites as *Clintonia, Trillium, Cornus canadensis, Tiarella, Maianthemum, Polygonatum, Actaea alba,* and others.

During the past summer a new iron fence was erected around the south addition, acquired by the Garden in the spring; and during July–September four entrances were provided with turnstiles, combined with a provision for baby carriages, the whole being along entirely new lines designed to obviate the necessity of an attendant at each entrance. Funds for the fence and turnstiles, amounting to about $2,600, were provided by private contribution from the chairman of the Committee on Botanic Garden.

Large numbers of living specimens of native wild flowers, collected on field trips, have been sent in to the Garden during the past season by members of the staff. The Garden hopes soon to have under cultivation large groups of each species that grows wild within 100 miles of Brooklyn. Persons interested in the Garden will confer a great favor by sending in living specimens of almost any perennial wild flower.

During August the buckwheat, grown for green manure on the museum esplanade and adjacent areas, was plowed under, the entire region graded, and sown with grass and clover. It was mowed for the first time on October 6.

Visitors to the Garden during July–September included Prof. Gentaro Yamada and Mr. Katudzi Uyemura, of the Higher School of Agriculture and Forestry, Morioka, Japan (July 3), Mr. O. T. Burger, Gainesville, Fla. (July 24), Prof. F. Kølpin Ravn, and Mrs. Ravn, of Copenhagen, Denmark (Aug. 12), Mr. Julius Matz, Experiment Station, Gainesville, Fla. (Aug. 20), Prof. Donald Reddick, Cornell University (Aug.), Prof. W. H. Rankin, also of Cornell (Sept. 2), and Dr. W. T. Bovie, of Harvard Medical School (Sept. 3).

Miss Shaw, assistant curator of public instruction, gave four addresses on September 6, 7, 8, and 10, before about 400 teachers of the Monroe County Teachers' Institute, at Anderson, Ind. The general subject of her talks were nature study and children's gardens. On her return journey she stopped at Cleveland, Ohio, and inspected the children's gardens and community gardens, so successfully carried on there under the supervision of Miss Louise Klein Miller.

On August 6, Prof. Harshberger, with a class in plant geography from the Brooklyn Institute Biological Laboratory, Cold Spring Harbor, L. I., inspected the Garden plantations.

Among interesting plants now in fruit in the economic house are the Chinese guava, cattleya guava, pawpaw, fig, lemon, kumquat, lime, and banana. The development of the banana plant and its bunch of fruit has been a subject of considerable popular interest. The plant was only about one foot high when planted

out, during the first week of July, 1914. Within six months it had become a plant twenty-five feet high to the tip of the leaves. Of the twelve or more leaves that remained on when the inflorescence appeared, the largest measures 3 ft. 6 in. wide by 12 ft. long, and the average size is 10 ft. by 2 ft. 6 in., making a very beautiful and striking specimen (fig. 17). The "bunch of bananas," over 250 in number, may now be seen in the process of ripening.

The leading article in *Landscape Architecture,* for July, 1915, is by Mr. Caparn and Mr. Taylor, of the Garden staff. It describes the plan of the general systematic section of the Brooklyn Botanic Garden, and is illustrated by two cuts, one a full page plan of the entire garden, and one a folder 11 × 21 inches, showing the arrangement of the beds and shrub masses in the systematic section.

The Garden Committee, of the Bronx Society of Arts and Sciences, has organized a "Boys' Garden in Bronx Park.", The members of the committee are Mrs. Steven B. Ayres, chairman, Hon. Thomas W. Whittle, Dr. William A. Murrill, and Mr. Henry Clews, Treasurer. The objects of this work, as stated on the committee's letter head, are as follows:

"To establish, equip and maintain a training garden for boys (14 to 16 years old) ready for working papers and unable to find work.

"To continue supervised organization; to give healthful occupation throughout the year; to encourage home and commercial gardening on unimproved property in the city.

"To issue certificates to graduates of regular course (two consecutive years) as School Garden Instructors; to afford post graduate training for specified commercial garden-projects; to aid in securing home gardens.

"To substitute a practical vocation and industrious associates for street idling, gang-life, and the reformatories, for the boys living in congested districts."

A visit to our plant houses emphasizes the urgent need for additional space. In fact it is probable that several specimens of tropical or subtropical plants will have to be sacrificed owing to lack of sufficient space to care for them during the coming winter.

IN MEMORIAM

ROBERT BUDDICON WOODWARD

Born in Brooklyn, New York
September 18, 1840

Trustee of the Brooklyn Institute of Arts and Sciences
1887–1915
Third Vice-President, 1905–1913
Second Vice-President, 1913–1915
First Vice-President, 1915

Staunch friend and generous supporter of the
Brooklyn Botanic Garden

Died in Cooperstown, N. Y.
September 2, 1915.

INDEX TO VOLUME IV

The Brooklyn Institute of Arts and Sciences

Officers of the Board of Trustees

President—A. AUGUSTUS HEALY
First Vice-President—COL. ROBERT B. WOODWARD*
Second Vice-President—GEORGE D. PRATT
Third Vice-President—WALTER H. CRITTENDEN
Treasurer—DANIEL V. B. HEGEMAN
Secretary—HERMAN STUTZER

Committee on Botanic Garden

ALFRED T. WHITE

WALTER H. CRITTENDEN — GEORGE D. PRATT
ALBERT DeSILVER — WILLIAM A. PUTNAM
GATES D. FAHNESTOCK — HERMAN STUTZER

Ex Officio Members of the Board

THE MAYOR OF THE CITY OF NEW YORK
THE PRESIDENT OF THE BOROUGH OF BROOKLYN
THE COMMISSIONER OF PARKS, BOROUGH OF BROOKLYN

* Deceased, September 2, 1915.

PUBLICATIONS

OF THE

BROOKLYN BOTANIC GARDEN

RECORD. Established January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the annual report of the director and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden and of the Department of Botany of the Institute. To others one dollar a year; 25 cents a copy.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

1. *The educational work of botanic gardens.* 13 pages. 1911.

2. *The purpose of an introductory course in botany.* 8 pages. 1911.

3. *Cryptomeric inheritance in Onagra.* 11 pages, figs. 2; plates 2. 1911.

4. *On the origin and present distribution of the pine-barrens of New Jersey.* 15 pages, figs. 2. 1912.

5. *Ingrowing sprouts of Solanum tuberosum.* 10 pages, figs. 6; plate 1. 1912.

6. *Intermingling of perennial sporophytic and gametophytic generations in Puccinia, P. obtusjens and Uromyces Glycyrrhizae.* 15 pages, 1 plate. 1913.

7. *Studies of teratological phenomena in their relation to evolution and the problems of heredity. I. A study of certain floral abnormalities in Nicotiana, etc.* 14 pages, figs. 4. 1914.

8. *Some observations on the formation of the capillitium and the development of Physarella mirabilis Peck and Stemonitis fusca Roth.* 15 pages, 2 plates. 1914.

9. *The growth-forms of the flora of New York and vicinity.* 9 pages. 1915.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

1. *The Brooklyn Botanic Garden.* Price, 5 cents.

LEAFLETS. Established April 10, 1913, and published weekly or bi-weekly during April, May, June, September, and October. The purpose of the Leaflets is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Current numbers free to all who wish them. Back series complete, 50 cts. each; back numbers, 5 cts. each.

SEED LIST. Issued in December of each year.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in cooperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription rates: to members of the Botanical Society of America, $3.00 a year; to all others $4.00 a year.